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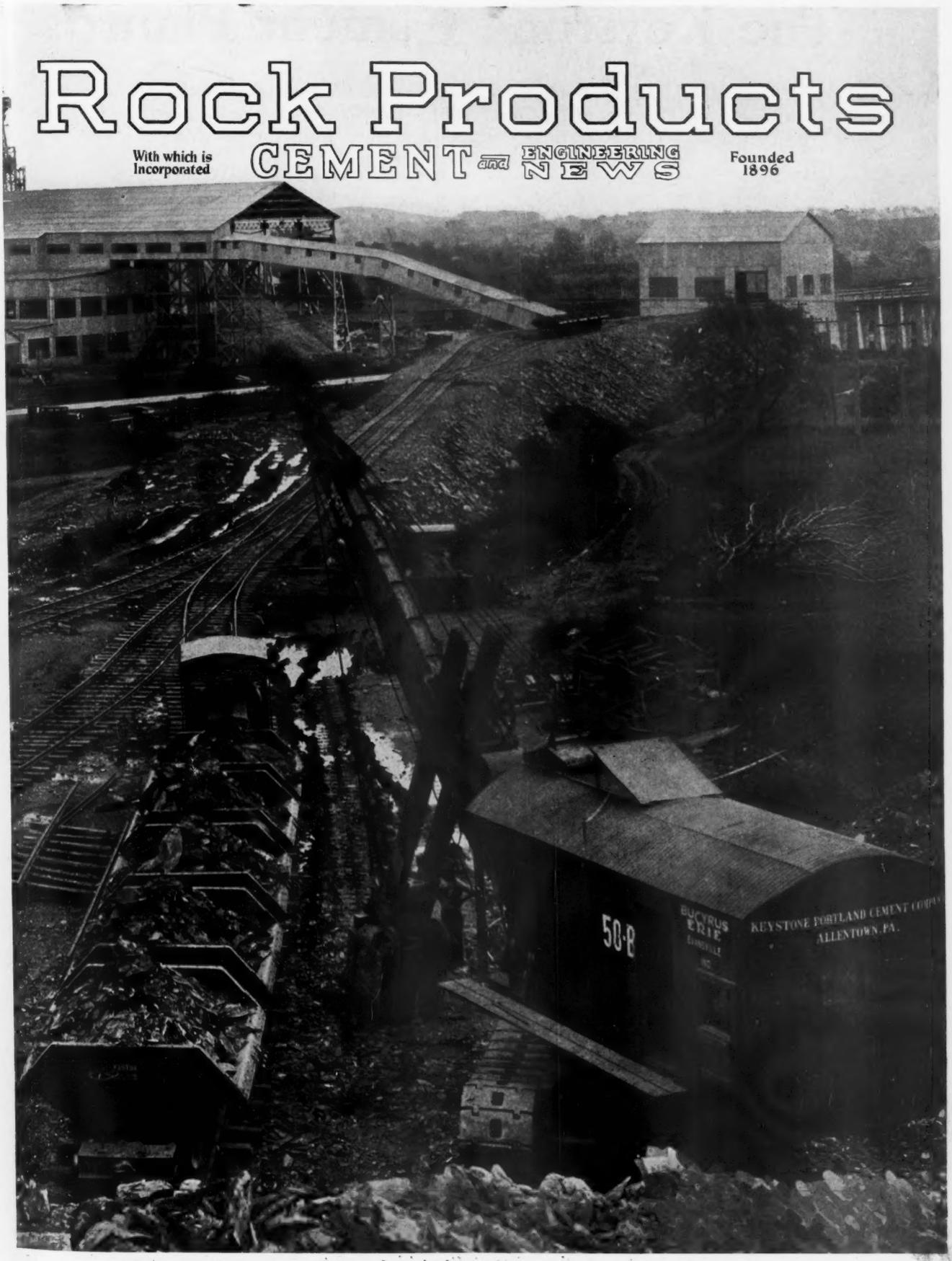
Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896



One of the electric shovels in the quarry of the Keystone Portland Cement Co. loading a train of 10-ton dump cars for transportation to the crusher house, shown in the background to the right

The Keystone Cement Plant

Practically All of the Mechanical Equipment in the Keystone Portland Cement Co. Plant, at Bath, Penn., Is of a Type Never Before Installed in America—Plant Carefully Designed and Well Constructed—Many Unique Features

By George M. Earnshaw
Eastern Manager, Rock Products

THE EYES of the cement industry have been on this plant ever since it started to grow, not only because it was announced that it would be composed primarily of European-type machinery, but because its founder, Fred B. Franks, who is vice-president and general manager, has a reputation for building fine cement plants and building each one at least just a little better than the last one. And now that the plant is ready for inspection, ROCK PRODUCTS is glad of the privilege of presenting to the industry a detailed description of it.

At present only one unit of the plant is completed, consisting primarily of a crushing plant, two raw and two finish grinding mills, two kilns, one coal pulverizing unit and a battery of ten cement storage silos. Construction is well under way, however, on the second unit. The guaranteed production per day is 3000 bbl. in a day, but one unit has produced as high as 3300 bbl. per day, and it is expected that "when all the wrinkles are ironed out," a production of 3600 bbl. can be attained. In this case, the plant will eventually have a capacity of 7200 bbl. per day.

The plant's layout, operation and process are more or less along conventional lines. The general flow of the materials from the quarry, through to the cement packers, is little unlike that in other modern plants. However, the design of the machinery itself is in many ways different from that commonly used. With a few exceptions, all of the mechanical equipment was built and furnished by the Polysius Corp., Bethlehem, Penn., and in the description that follows, unless otherwise mentioned, it will be understood that the machinery referred to was built by this manufacturer.

The Quarry

The face of the quarry is about 400 ft. long. Its height at one end is 40 ft., tapering down to 20 ft. at the other end. The stone has an overburden on an average of only 2 to 4 ft. of earth, which is removed (by contract) by a ½-yd., gasoline-powered shovel (General Excavating Co.), which loads into motor trucks. This dirt is being used for a fill between the quarry and crushing plant at present, although there is sufficient dumping ground for several years' operation.

The deposit is composed of the well-known Lehigh Valley natural cement rock, and the Keystone company is unusually fortunate in that the site selected is productive of materials of the most ideal chemical analyses. The average of two analyses of samples of "high calcium rock," made at the time of the writer's visit, was: SiO_2, 6.75; R_2O_3, 5.10; $CaCO_3$, 85.52; $MgCO_3$, 2.50. The average of two analyses of samples of "low calcium rock," made at the same time, was: SiO_2, 13.05; R_2O_3, 7.76; $CaCO_3$, 75.23; $MgCO_3$, 3.75. The high calcium limestone is taken from one end of the quarry, while low calcium limestone is taken from the other. And this circumstance seems to lend itself well into the future, for tests made by two prospecting drills, working to a depth of 265 ft. below the present quarry floor,

A general view of the plant of the Keystone Portland Cement Co., with one of the 1 3/4-yd. electric shovels loading to 10-ton cars in the foreground

show the material to run uniformly parallel to the above quoted analyses. The property was prospected and reported upon by Prof. B. L. Miller, of the geological department of Lehigh University, and Richard K. Meade, consulting engineer of the cement company.

Blast-hole drilling is done by two Cyclone and two Keystone machines, all of which are gasoline-engine driven. Two model 50-B Bucyrus-Erie electric shovels, equipped with General Electric motors and Ward-Leonard control and fitted with 1¾-yd. dippers, load into standard-gage, 10-ton, all-steel Phoenix cars, of which there are 12, manufactured by the Easton Car and Construction Co. Two 15-ton Whitcomb gasoline locomotives do all the hauling, four and five cars to the train.

Crushing Plant

The grade between the quarry and crushing plant is very slight, and the distance is approximately 1000 ft. The track extends through and beyond the crusher building on a trestle 140 ft. long, which affords a storage for loaded cars. Loads are pulled from the trestle to the dumping point by a 2-drum Flory hoist, powered by a 20-hp. motor. (All motors, controllers and other electric equipment in the entire plant were furnished by the General Electric Co.) A cable on the other drum of the hoist is used for dumping the cars. Overhead is installed a 15-ton chain-operated Box crane for making repairs on the crusher, feeder or motors.

Here are installed what seemed to the writer to be two of the most interesting pieces of machinery in the plant: The feeder and the crusher itself. The feeder forms the bottom of a hopper, 14 ft. square at the top, vertically lined with 80-lb. rails. It is 5 ft. 7 in. wide, 20 ft. long, and consists of five stationary bars and six moving bars, placed alternately, one with the other, and parallel to each other. The moving bars are connected at each end by a common shaft, and these two shafts are connected to and operated by an eccentric shaft. When operating, the moving bars rise, move forward a few inches, deposit their load of stone, move backward, rise, move forward again, and so on. It provides a positive and regular feed, the speed of which can be regulated, as the motor is of variable speed. The motor's speed range is from 600 to 1200 r.p.m. and that of the eccentric shaft from 14 to 28 r.p.m.

There is nothing unusual about the dimensions of the crusher; it is not as large as many of the larger jaw crushers, but it does a remarkable work. It is capable of receiving a stone measuring 40x30x25 in. and reducing it to ¾ or 1 in. and smaller, in one operation. It is known as the Solo crusher, is of the swing-hammer type, slow running, and has a guaranteed capacity of 250 tons per hour. This tonnage has been exceeded, however, by 100 tons, according to an official of the company. The crushing chamber is 79 in. in diameter and 87 in. wide, and the main shaft and hammers, of which there are 48, each weighing 130 lb., are forged in one piece. The shaft is direct connected to a 350-hp. Type TSR supersynchronous motor, through an American Crusher and Machinery Corp. magnetic clutch, and operates at a speed of 180 r.p.m. Power consumed by the crusher thus far has averaged approximately 300 hp. The fly-wheel of the crusher is fitted with a special type safety cutout.

The output of the crusher goes by gravity to a 36-in. conveyor belt of 355-ft. centers, housed in an inclined gallery extending from the crushing plant across the state highway and railroad tracks to the raw materials storage. It can be made to discharge at any

A trainload of 10-ton cars and a 15-ton locomotive on its way to the crushing plant

A view in the quarry, with the shovel at the left working in "low rock" and the shovel at the right working in the "high rock"

The crushing plant and the storage trestle for cars at the left

desired point in the storage yard, or into any of the raw mills' bins, through a portable shuttle-type tripper, mounted on tracks over the conveyor. The conveyor is driven by a 40-hp. motor through a 900 : 75 speed reducer.

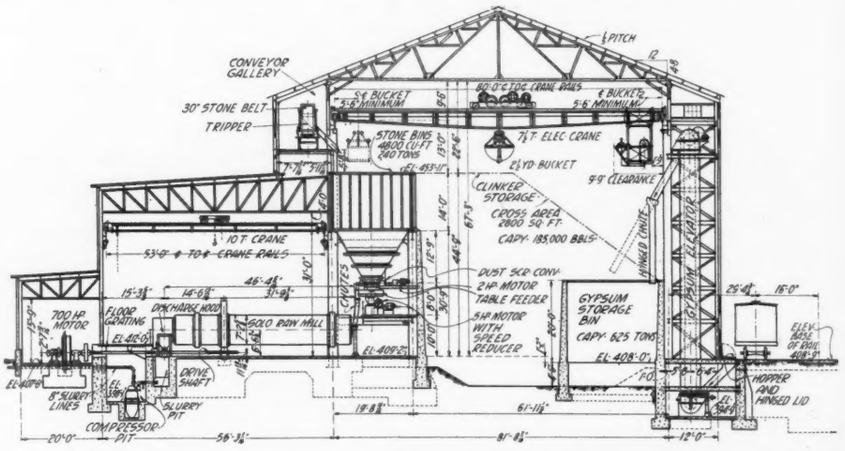
Raw Materials and Clinker Storage

The storage yard extends perpendicular to the center lines of the mill building, and kiln and coal buildings. It is 80 ft. wide, 40 ft. high and 500 ft. long and is served by one crane, a 6½-ton Shepard, which handles a 2½-yd. Hayward clamshell bucket. The yard provides a storage for 22,500 tons each of high and low calcium stone, 250,000 bbl. of clinker, 1500 tons of gypsum, and 10,000 tons of coal. In addition, each of the stone bins over the raw-grinding mills has a capacity of 400 tons, the gypsum bins, 100 tons each, and the clinker bins, 1800 bbl. each.

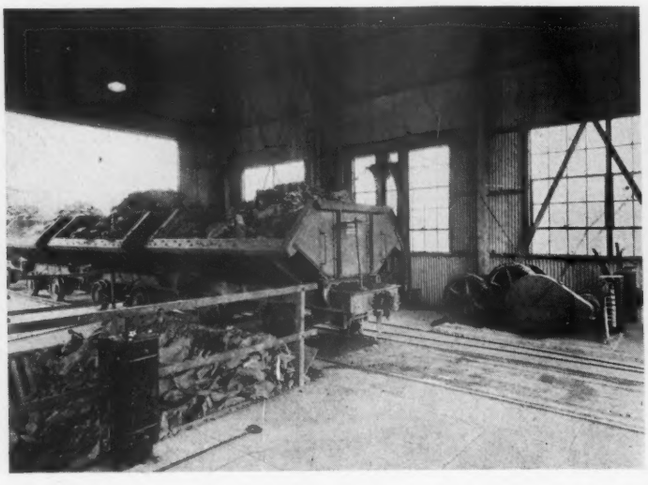
Raw Grinding, Slurry Handling and Storage

There are two 7x42-ft. 8-in. raw-grinding mills, which are of the 3-compartment type, each driven by a 700-hp. Type TSR supersynchronous motor, running 144 r.p.m. All joints in the mills are spliced and hammer-welded and the only rivets used are those which fasten the partitions, manholes and heads. Each mill is fed by a table feeder, 72 in. in diameter, which provides a positive and steady feed, said to be within a tolerance of 1% of accuracy, plus or minus. These feeders are each driven by a 5-hp. Type CD direct-current motor through gearing.

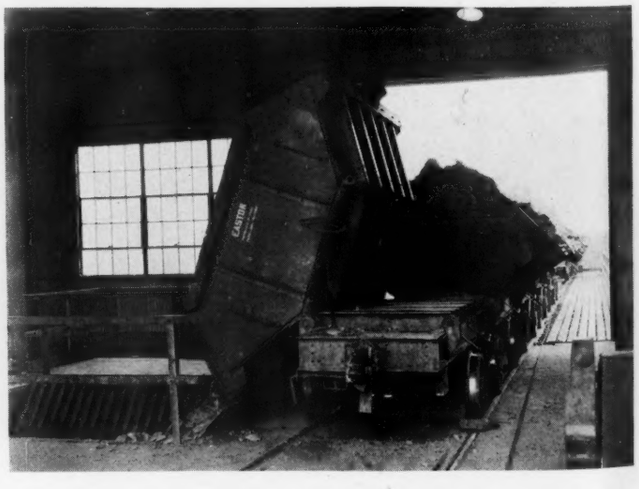
From the mills the slurry is chuted to a pit and from the pit by gravity to two sets of "Pressors," which pump it directly to the storage tanks. As these machines are one of the most unique pieces of machinery in the plant, a more or less complete description of them will be attempted. They are more like what is known in the chemical industries as an "acid egg" than a pump, are entirely self-contained, are automatic and are operated by compressed air. A set consists of two "Pressors," interconnected in such a way that while one is filling with slurry by gravity, the other discharges, by pressure. Both the inlet and outlet lines enter each receiver at the bottom. The interior contains a float, which, when the machine is full, connects with a control mechanism that reverses the action and admits the air pressure at the top, thus forcing the slurry into and through the line to the desired tank or pit. It is claimed that one of the greatest advantages of this type of machine is, that because the compressed air follows the slurry column, it keeps the line clean at all times. In any event, there is a continuous and automatic movement of the slurry, at a speed of 90 bbl. per hour per set of "Pressors." Each machine is equipped with a recorder so that there is an accurate knowledge of the num-



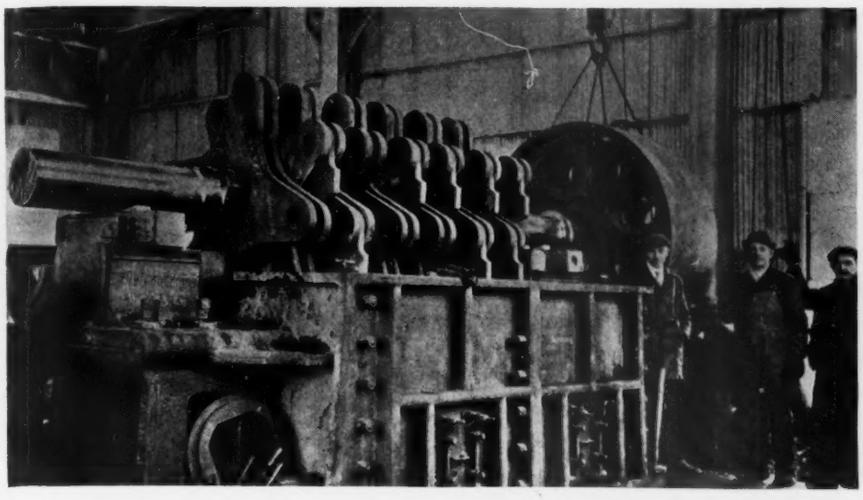
Sectional view through the new grinding mill house



A trainload of cars about to be dumped. The controller in the foreground operates the feeder



Dumping to the crusher. The hoist which dumps the cars also pulls them in from the storage on the trestle



The installation of the crusher, showing the main shaft with the flywheel and 48 hammers being lowered into position

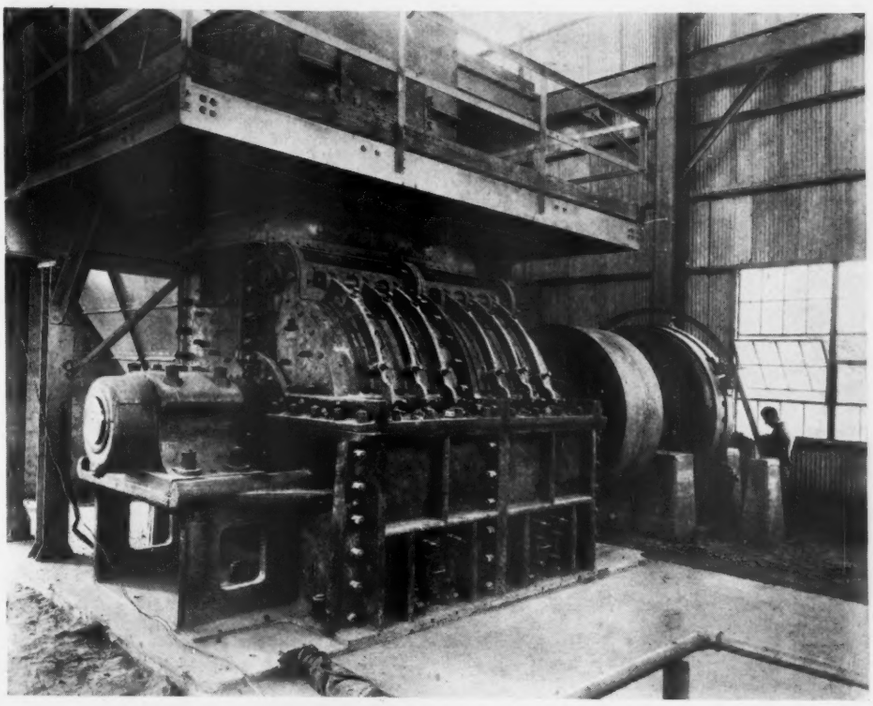
ber of charges, or discharges, per hour, or day.

Six concrete silo-type tanks, 45 ft. high and 20 ft. in diameter, each having a capacity of 1378 bbl., receive the slurry as it comes from the mills. And here is found another new kind of apparatus in the form of the "Regulex" system of agitation. There are no mechanical agitators and the operation is entirely dependent upon compressed air. This is introduced into each tank through 28 separate ¾-in. lines, extending to within a few inches of the bottom of the tank, which lead off of two 2½-in. main lines mounted over the tops of the tanks.

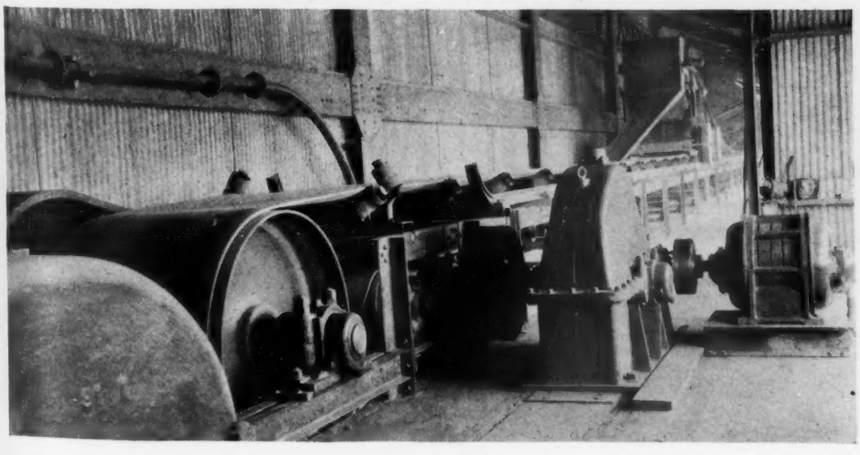
The "Regulex" system was intalled to provide for uniformity and regularity of agitation in each tank. It is simply an automatic control apparatus which may be set to allow any desired period of agitation for each tank, and to shift from one tank to the other, in any desired order, or to completely omit one or more tanks. The normal operation, however, would call for it to provide agitation in the six tanks, one after another in rotation.

The six tanks drain into one common pit from which the slurry is pumped by two sets of "Pressors" to either one of two concrete blending tanks, 24 ft. in diameter by 45 ft. high. After correction the slurry flows into another pit and from this pit two sets of "Pressors" pump it directly to the kiln-feed tanks. Both of the slurry pits mentioned are fitted with automatic floats which prevent the possibility of flooding. The kiln-feed tanks are 9 ft. in diameter and 10 ft. high and are mounted directly over the kilns. Feed to the kiln is by gravity and is regulated through the use of a revolving disk with eight different sized openings. To reduce the feed it is only necessary to feed through a smaller opening, or visa versa, as desired.

The construction of the slurry tanks is somewhat novel, and is the design of Richard K. Meade and Co., consulting engineers, of the cement company. In building these tanks sliding forms were used. The tanks themselves are 45 ft. high. When this height was reached, the inside of the forms was blocked off and the outside walls of the tanks were run up another 10 ft., and a concrete roof slab thrown over the whole, thus forming a gallery above the tanks and an economical all-weather concrete structure. This roof rests on these side walls and on steel beams, which in turn are supported by two rows of columns run up from the tank intersections.



The swing hammer crusher runs at only 180 r.p.m., and reduces to 3/4 or 1-in. size



The drive end of the stone conveyor showing the automatic discharge tripper

Kilns

The total length of each of the kilns is 250 ft. At the feed end there is a 10-ft. diameter section 165 ft. 10 in. long, then a funnel-shaped section, 6 ft. 2 in. long, followed by a 38-ft. section, which is 13 ft. 3 in.

The general storage yard, where one 6 1/2-ton crane with a 2 1/2-yd. bucket takes care of all the material handling

in diameter. Then another funnel or taper of 6 ft. 2 in. length, a 6 ft. 2 in. section 10 ft. in diameter, a 2-ft. funnel connection, and finally, a 25 ft. 8 in. section, 12 ft. in diameter. The kilns, too, are known by the name "Solo," for, in addition to drying, calcining, and burning, they also accomplish, in a single operation, the cooling of the clinker. This is done in the 12-ft. diameter section at the firing end. In looking through this section from the firing platform, one has a sort of telescopic view of the firing zone. All plate work, including the construction of the shells for the kiln and coal dryer, was done by the Coatesville Boiler Works, Coatesville, Penn., according to Polysius Corporation's design. Each kiln is mounted on six self-aligning, water-cooled bearings and is driven by a 60-hp. direct-current motor through a special arrangement of gearing.

There are two pulverized coal bins over the kilns, each having a capacity of 43½ tons, with bottom spout discharge. Two small screw conveyors feed the coal from each bin into the main feed pipe for each kiln. This installation is different from the average, for the feed line to each kiln is adjustable, forward or backwards to or from the kiln, and may be turned as desired. The line in each kiln extends 30 ft., through the cooling chamber to the firing zone, with no supports. Each line is made up of 10-in. pipe mounted within a 14-in. pipe, so that, by passing air between the two pipes as the coal is being blown through the inner one, the coal is kept cool as it passes through the cooling zone and until it reaches the firing zone. The coal feed blowers are of a special type and are driven by 60-hp. motors through flexible couplings. Up to the present time the guaranteed maximum coal consumption, of 95 lb. per barrel of clinker, has not been exceeded.

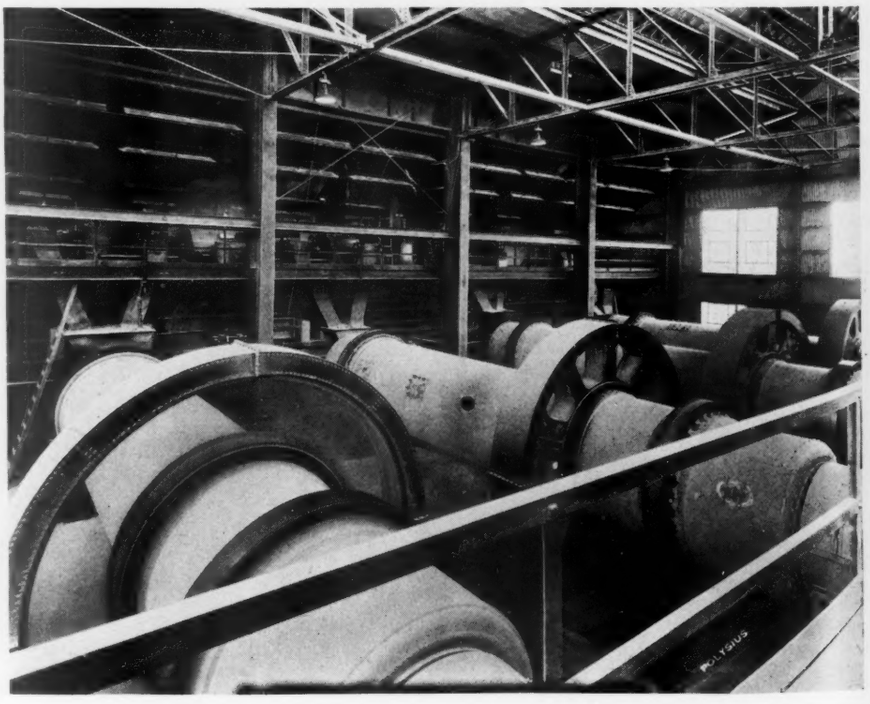
Each kiln is fitted with a large concrete dust-settling chamber, having a V-shaped bottom, in which operates a screw conveyor. The conveyor empties directly into a 4-in. Fuller-Kinyon pump, which conveys the dust several hundred feet to two bins over the raw grinding mills. (It is introduced into each mill from the bins by means of a double-screw conveyor, driven by a 2-hp. direct-current motor through a special reducer.) The dust chambers are located directly between the kilns and the stacks. The latter are of concrete and were erected by the Rust Engineering Co. They are 218 ft. high, 18 ft. in diameter at the bottom and 12 ft. in diameter at the top.

Coal Plant

Coal is unloaded from hopper-bottom railroad cars into a track hopper. (The track for incoming coal and gypsum parallels the storage.) As it is unloaded, the coal drops directly into a large tapered-bottom steel bin, from which it is fed by a special type mechanical feeder, driven by a 7½-hp. motor through a 906:90 speed reducer. This feeder serves a small Link-Belt coal crusher driven by a 25-hp. motor through a 3:8:1 Link-Belt-Sykes speed reducer. The crusher discharges on a 20-in. belt conveyor extending through a tunnel under the storage leading directly to the coal plant. Here it is elevated in an enclosed, chain-bucket elevator and emptied either into a steel tank over the coal dryer, or discharged into storage. For reclaiming from storage, there are openings in the tunnel through which the coal falls to a portable table feeder mounted over the main conveyor. Thus, the conveyor is used not only for conveying from the crusher but also from the storage to the plant. It is driven by a 15-hp. motor through a 900:30 speed reducer.

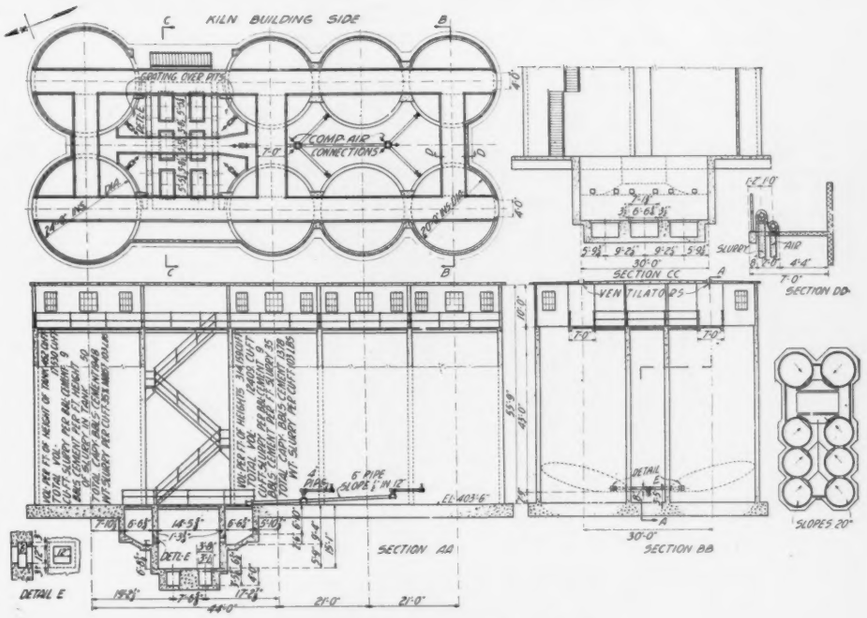
The dryer is 6 ft. in diameter, 60 ft. long, is mounted on two tires and is driven by a 15-hp. motor through gearing. Its firing chamber is equipped with an automatic stoker powered by a 3-hp. direct-current motor.

An interesting feature here is an exhaust gas washer, or scrubber, with which the



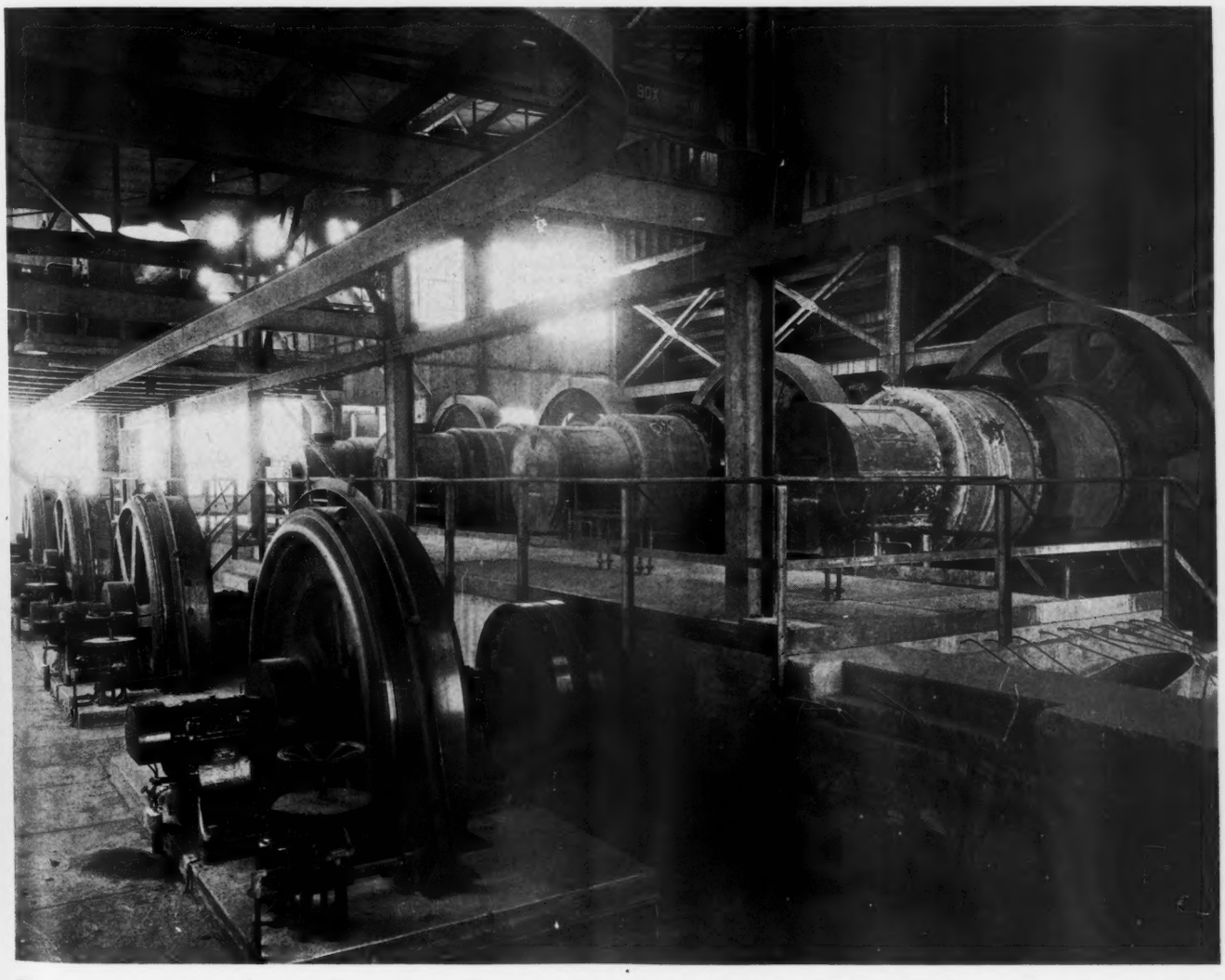
Looking down on the mills from platform over the discharge ends

dryer is equipped, which prevents the discharge of dust from the dryer's stack. It consists of two vertical, cylindrical chambers, interconnected one above the other, with a suction fan, driven by a 15-hp. motor, between them. The waste gases and fine dust drawn from the dryer enter the bottom of the lower chamber through a pipe provided with a conical cap which deflects the gases and dust towards the walls of the chamber. A series of nozzles is located above the cap of the smoke inlet pipe, and the water spraying from the nozzles produces a heavy, penetrating mist which completely fills the chamber. The gases have to pass through this dense mist, which scrubs them and precipitates the coal dust to the bottom of the chamber, from which it flows through a pipe to a settling basin. The scrubbed gas, leaving through the top of the lower chamber, enters the fan, which in turn discharges it to the upper washing chamber in the same manner as it entered the lower one. Here the gas is again scrubbed by another series of water sprays, and any dust not caught in the first washing is precipitated to the bottom of the chamber and carried to the settling basin. The waste gas, now free of dust, is discharged into the atmosphere through a stack mounted on top of the upper chamber.

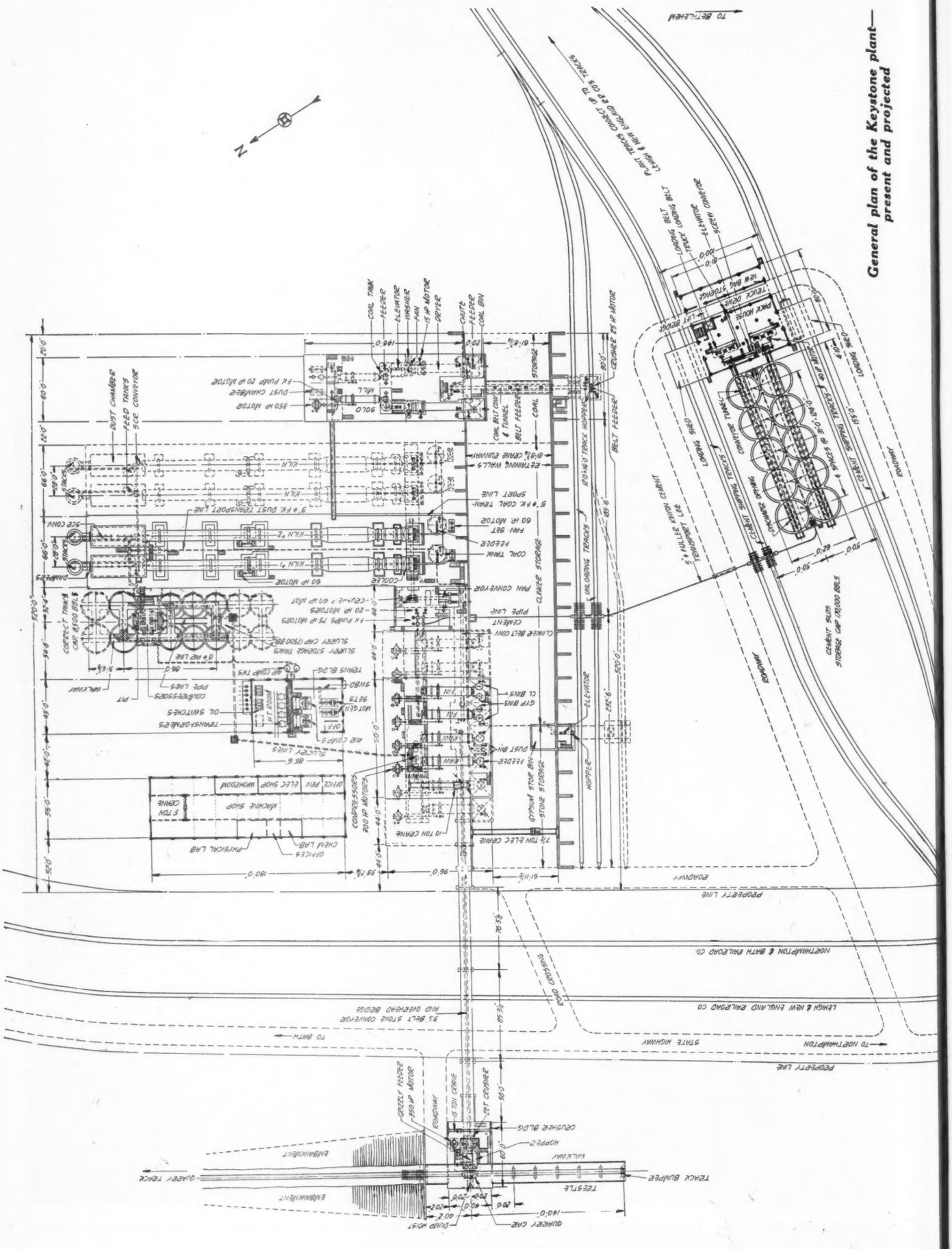


Plan and elevation of slurry tanks

The dryer discharges into the boot of an



The two raw grinding and two finish grinding mills and motors. They are 7x42 ft., driven by 700-hp. supersynchronous motors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PROPERTY LINE
NORTHAMPTON & BATH RAILROAD CO
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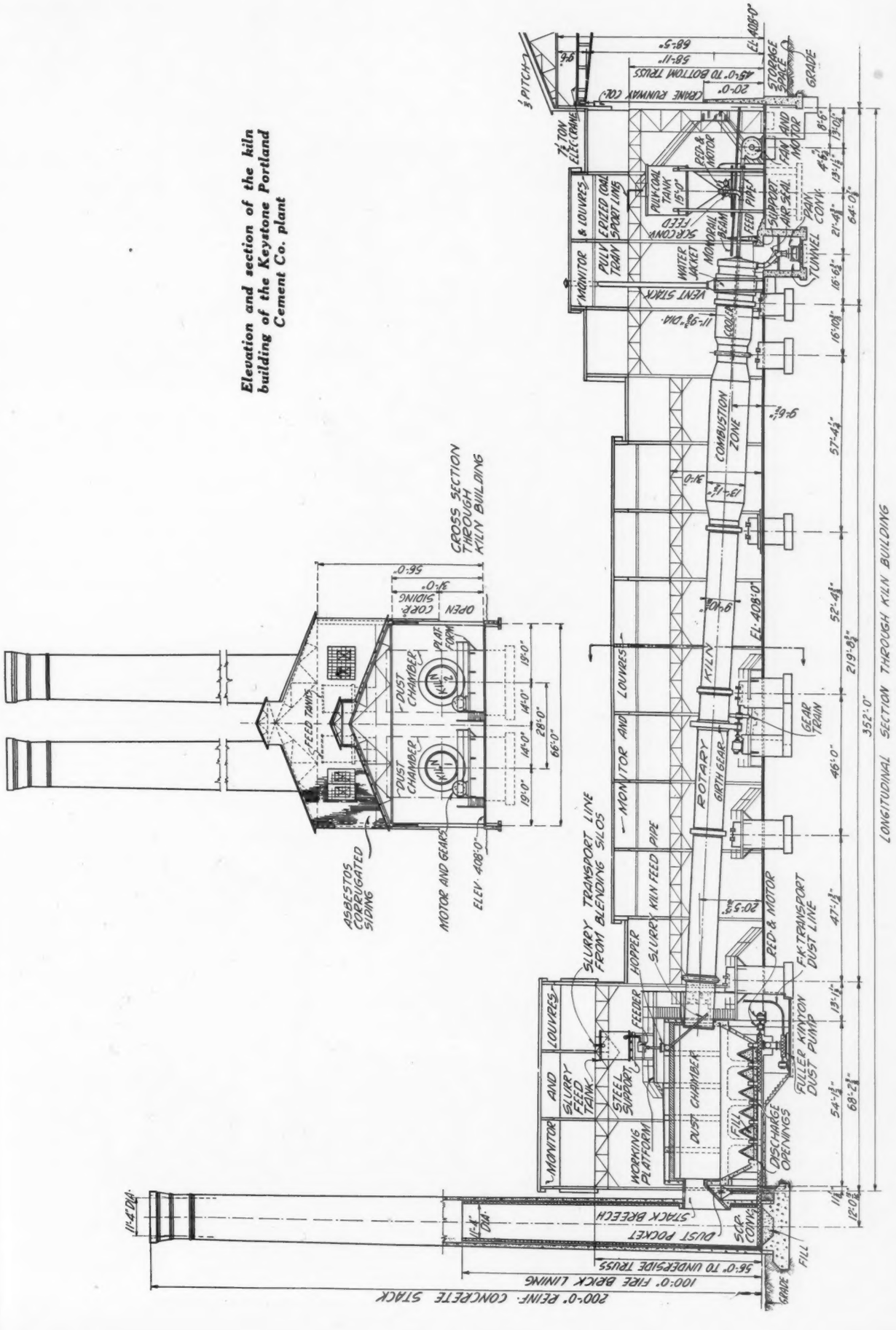
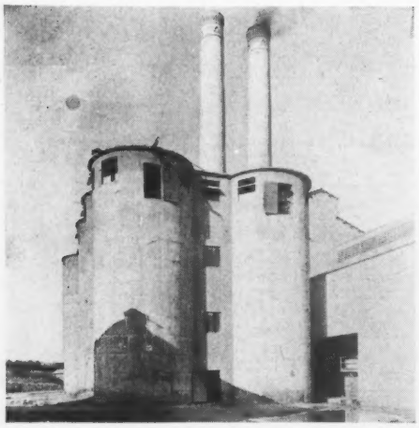
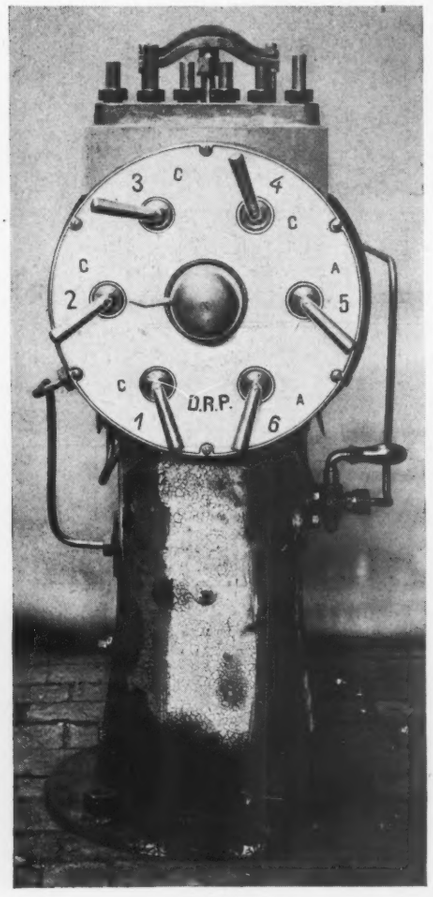
ROADWAY
CRUSHER BLDG
TRACK BUNKER
QUARRY CAR
CEMENT SHIPPING TRACKS
LOADING SHED
CEMENT SILOS
STORAGE CAP 180,000 BBLS
COAL STORAGE
CLINKER STORAGE
GYPSUM STONE BIN
STONE STORAGE
MACHINE SHOP
ELEC SHOP
WASHROOM
OFFICES
PHYSICAL LAB
CHEM LAB
TRANS BLDG
CONVEYOR OPENING
TRUCK DUMP
TRUCK BUNKER
LOADING BELT
TRACK LOADING BELT
ELEVATOR
SCREEN CONVEYOR
CONNECT UP TO LEHIGH & NEW ENGLAND RR CO'S TRACKS
General plan of the Keystone plant—present and projected


LONGITUDINAL SECTION THROUGH KILN BUILDING
CROSS SECTION THROUGH KILN BUILDING
Elevation and section of the kiln building of the Keystone Portland Cement Co. plant
200'-0" REINF. CONCRETE STACK
100'-0" FIRE BRICK LINING
56'-0" TO UNDERSIDE TRUSS
STACK BREECH
DUST POCKET
SCR CONV
DISCHARGE OPENINGS
DUST CHAMBER
WORKING PLATFORM
STEEL SUPPORT
SLURRY FEED TANK
AND
MONITOR
LOUVERS
FEEDER
HOPPER
SLURRY KILN FEED PIPE
SLURRY TRANSPORT LINE FROM BLENDING SILOS
MONITOR AND LOUVERS
ROTARY KILN
GIRTH GEAR
PIN
GEAR TRAIN
COMBUSTION ZONE
FULLER KINYON DUST PUMP
F.K. TRANSPORT DUST LINE
MOTOR AND GEARS
ELEV 408'-0"
ASBESTOS CORRUGATED SIDING
FEED TANKS
PLAT FORM
OPEN CORR. SIDING
VENT STACK
WATER JACKET
MONORAIL BEAM
FEED PIPE
SUPPORT AIR SEAL
FAN CONN.
TUNNEL
STORAGE BIN
GRADE
FILL
CRANE RUNWAY COL.
45'-0" TO BOTTOM TRUSS
20'-0"
68'-5"
58'-11"
¾ PITCH
7½ TON ELEC. CRANE
FULLY TRAIN
PULV. COAL TANK
SCR CONV FEED
RED. & MOTOR
FAN AND MOTOR
EL. 408'-0"
EL. 408'-0"



These six slurry storage tanks have a combined capacity of more than 8000 bbl. Agitation in them is entirely by air

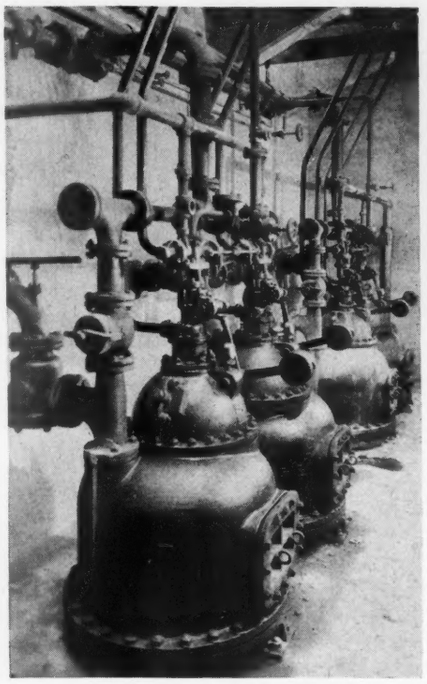
enclosed, chain-bucket elevator, which empties into a steel bin over the grinding mill. The bin feeds directly to a table feeder and under the feeder is a special type weighing device which furnishes a graphic record of



Control apparatus for air agitation in the slurry storage tanks

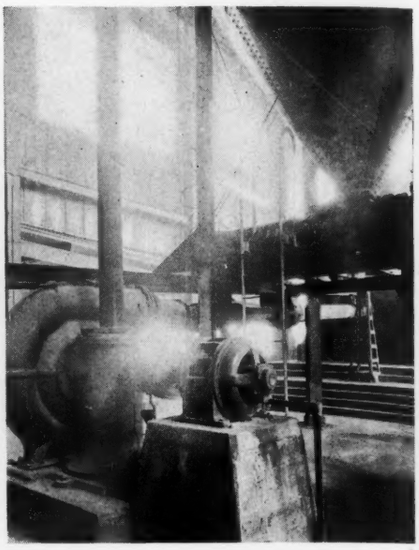
the number of pounds of coal per minute fed to the mill and thence to the kiln.

The mill is 6 ft. in diameter, 39 ft. long, and is driven by a 350-hp. Type TSR supersynchronous motor, direct connected through an elastic coupling. While this is an unusual method of pulverizing coal, in this country, it is not entirely new, being used in at least one other modern plant to the writer's knowledge. The mill is in three compartments, the first being charged with 2½-in. media, the second with 1½-in. and the third with punchings (about ⅞-in.). The rated



A close-up view of two sets of "Pressors." They are automatically controlled and operate by air

capacity of the mill is six tons per hour and its product is 99% through 100 mesh. It discharges direct into a 6-in. Fuller-Kinyon coal pump which conveys to the storage tanks over the kilns. (A second pump is being installed to be used as a stand-by.)

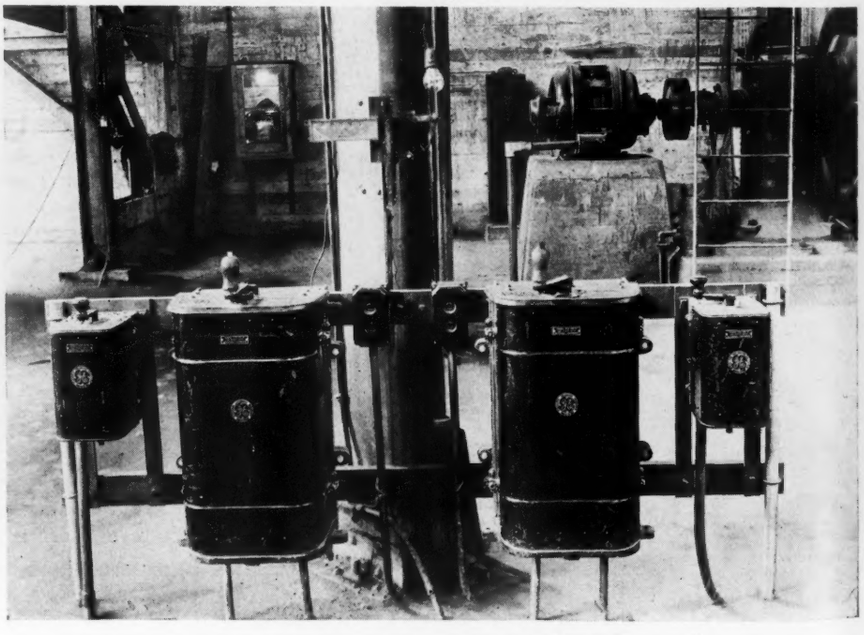


Coal feeding arrangement at one of the kilns. The pipe extends 30 ft. into the kiln through the cooling zone

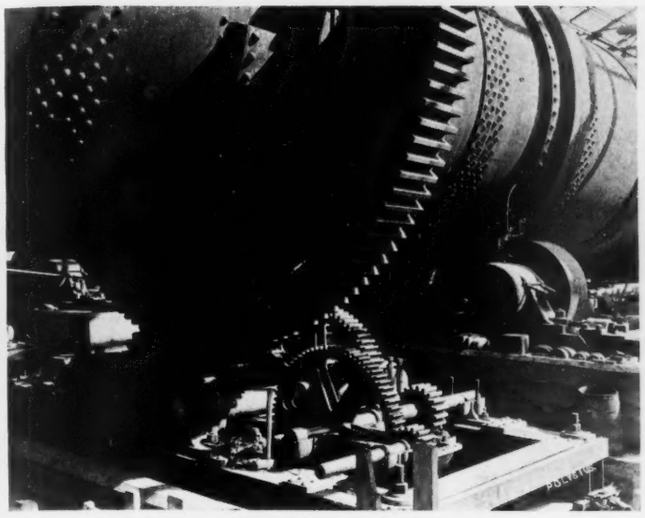
Dust from the mill is caught by a special type of collector mounted on a platform behind and over the discharge end. It is of the suction filter-tube type and is in five sections of 8 tubes each. It is enclosed in a steel cabinet with large doors, affording accessibility for repairs. A 20-hp. motor drives its 56-in. fan.

Finish Grinding

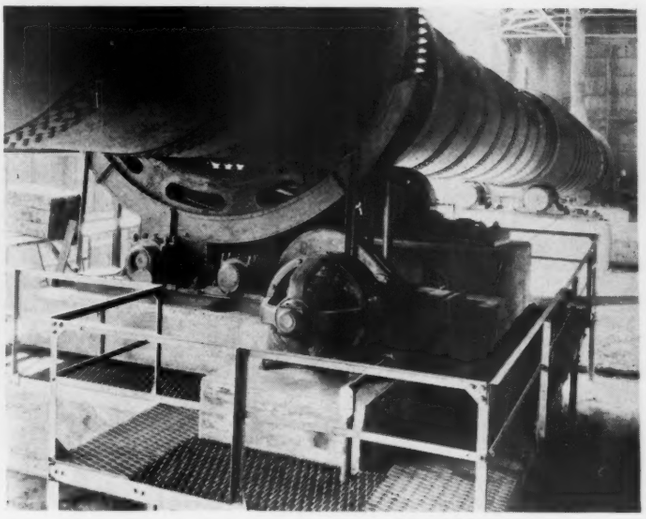
Clinker is chuted from the cooling zone of the kiln into a 36-in. pan conveyor running perpendicular to the center lines of, and under the kilns. It extends on the level for 38 ft. and then rises at in inclination of 16 deg. for a distance of 26 ft., where it empties into a crusher. This machine is a heavy 2-roll breaker and is driven by a 40-hp. motor through a 900:75 speed reducer. It dis-



Variable speed controllers for kilns



Kiln drive with guards removed



Close-up view of the kiln driving arrangement

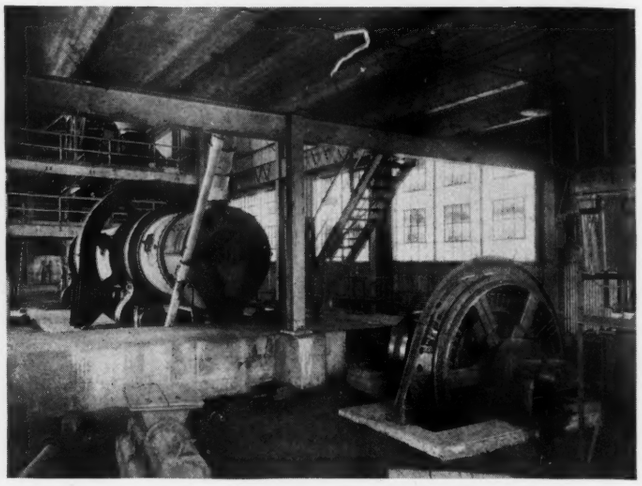
charges into another 36-in. pan conveyor of 32-ft. centers, inclined also to 16 deg., which empties into an enclosed chain-bucket elevator. The elevator can discharge either into the general storage or on a 36-in. belt conveyor, of 96-ft. centers, serving the mills. This conveyor is of exactly the same type as the stone conveyor and operates in the opposite end of the same gallery. It is driven by a 10-hp. motor through a 900:30 geared and enclosed speed reducer.

The 1800-bbl. clinker bins are directly over the head-end of the mills, and they feed into 72-in. table feeders serving the two 7x42-ft. 8-in. Solo mills, the installation and motors of which are identical to those of the raw grinding mills. Gypsum is fed each mill by a 40-in. table feeder; one 7½-hp. motor drives one clinker and one gypsum feeder through a special gear-box and shafting hook-up. Each mill is equipped with an 8-section (64 tubes) dust collector operated with a 56-in. fan and 25-hp. motor.

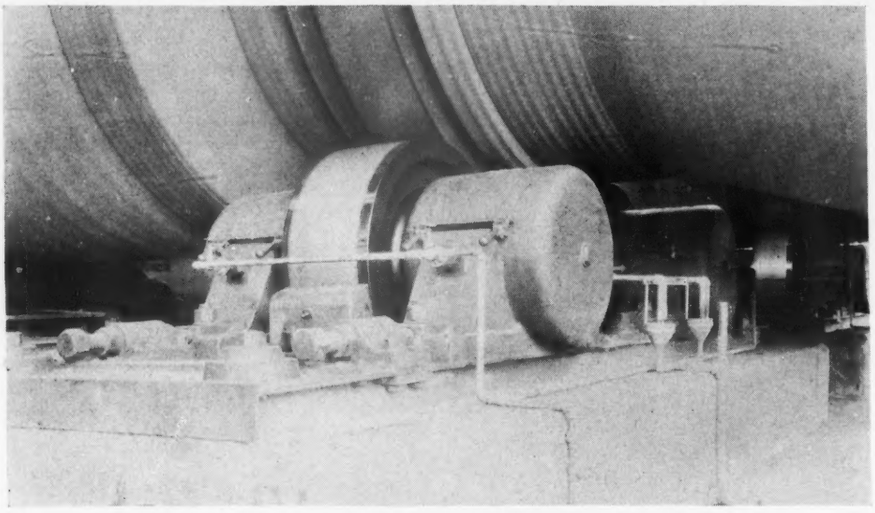
The finished cement is moved in a screw conveyor for a short distance to two 6-in. Fuller-Kinyon pumps (one is held in reserve as a spare), each driven by a 75-hp. motor. From here the cement is pumped approximately 330 ft., underground, to the silo storage tanks.

The kilns. The one on the right was just being lighted when this photograph was taken

Close-up view of one of the table feeders in coal mill



The 6x39-ft. coal grinding compartment mill and 350-hp. motor

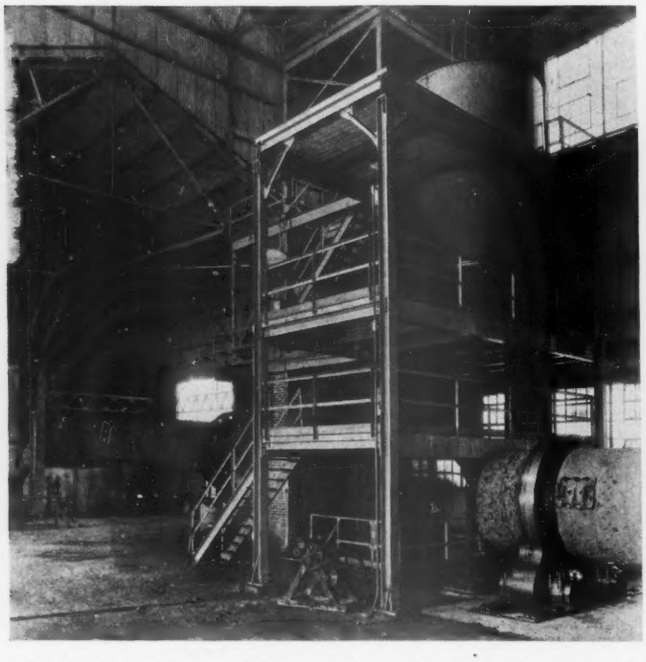


One of the six sets of bearings on which each kiln rolls

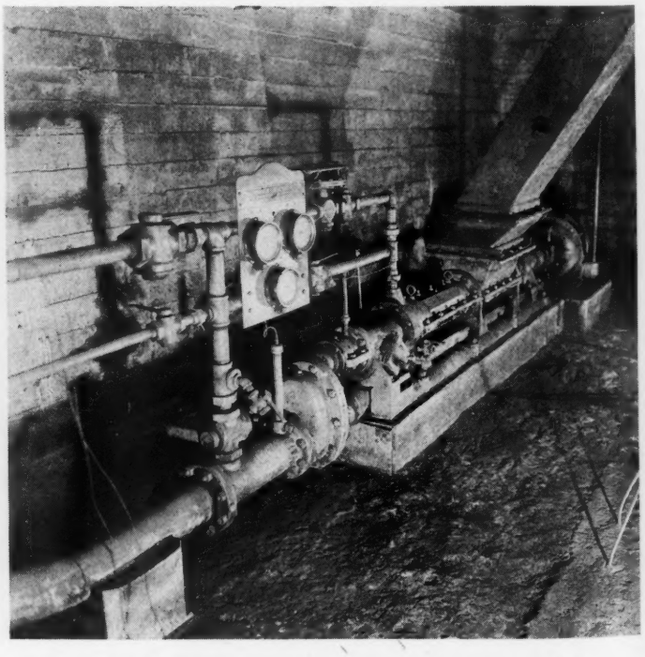
Packhouse and Silos

The packhouse is a 4-story, all-concrete building, 80 ft. wide and 81 ft. long, placed at the end of two rows of silos and having facilities for truck loading at one end and car loading at either side. (The track on the back side was being laid at the time of our visit.) There are ten silos, each 30 ft. in diameter and 90 ft. 6 in. high, which, with the interspaces, have a total capacity of approximately 153,000 bbl. These silos are of the Meade type. They are self-empting and more eonomical to build than the flat-bottomed type, in which the silos are carried on columns and side walls. In this Meade type the screw conveyors are in covered passage ways, which run through the silos, and the weight of the cement is distributed over the whole supporting mat.

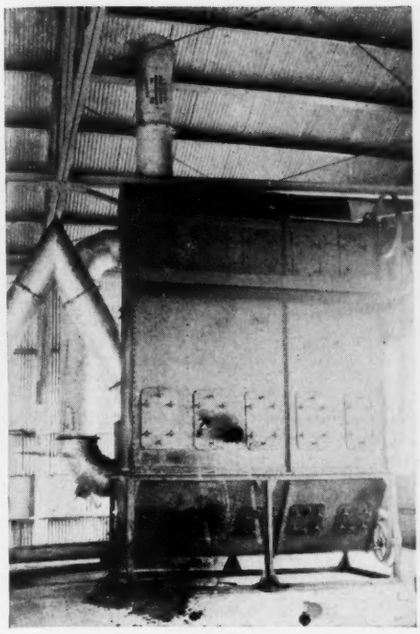
Cement is drawn from the silos into screw



On the left is the coal dryer and on the right, the feed end of the grinding mill; table feeder is under the storage tank



The coal mill discharges directly into this pump, which conveys the pulverized coal to the kiln feed tanks

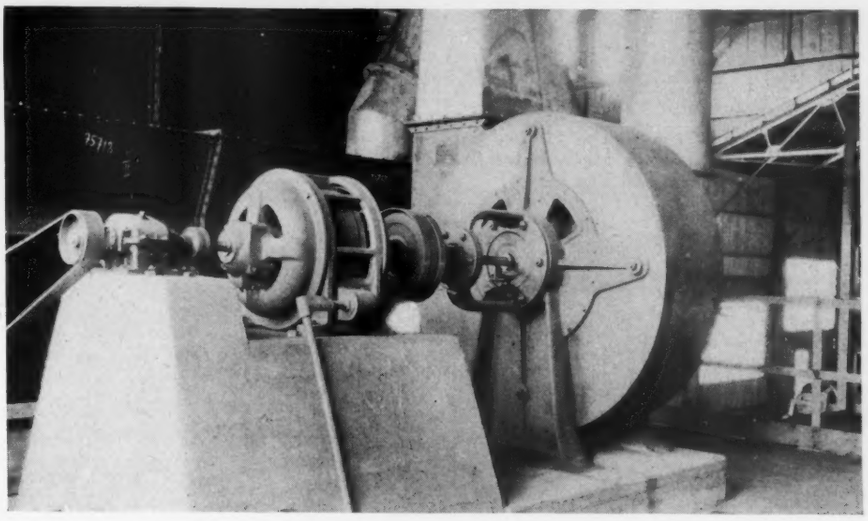


One of the dust collectors. This one is in the coal plant

conveyors, of which there is one for each row of silos. Each conveyor discharges into its own cross screw, which feeds into an enclosed, chain-bucket elevator. Each set of conveyors is driven by a 40-hp. motor through a 900:75 speed reducer. The elevators discharge into two screw conveyors on the third floor which distribute to the desired packer bins. Cross discharge spouts are provided in the elevators, so that it is possible to discharge from either elevator to either of the two conveyors. These conveyors are end to end in the same casing, but convey in different directions, each one serving two packers on the floor below.

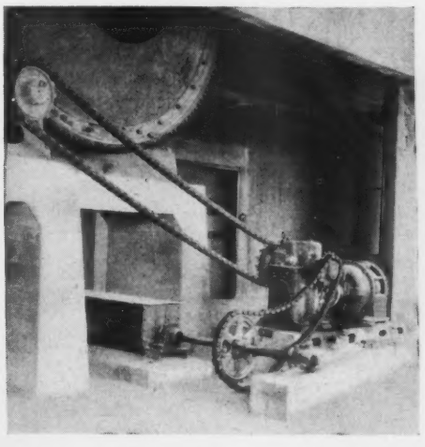
On the first floor there are two pairs of 3-tube Bates packers, each pair served by a belt conveyor. One pair is for loading on one track; the other for loading on the track on the opposite side of the building. Each packer is driven by a 20-hp. motor and each conveyor by a 3-hp. motor. Spillage from the packers is received in a screw conveyor which empties into the elevators. For checking weights, there are two Toledo, no-spring, platform scales.

The balcony floor provides storage space for both paper and cloth bags. On the second floor are two 40-tube dust collectors for the four packers, and this floor is also used for the storage of bags. The third floor houses the bag cleaner and its dust collector, which also is of the 40-tube size. The bag cleaner is of special design built by the Bethlehem Foundry and Machine Co., Bethlehem, Penn., but is of the usual rotary type, and has a capacity of 30,000 bags per day. It is sprocket-chain driven by a 25-hp. motor through a 9¾:1 De Laval speed reducer. A 36-in. belt conveyor removes the bags as discharged, for sorting and repairing. The third floor also has storage space for corrugated car-lining paper. The fourth floor simply provides headroom for the elevators and the bag cleaner as well as storage space for bags. The fans of the three dust collectors in the packhouse are each driven by a 20-hp. motor, and like the collectors in the other parts of the plant, the screw conveyors which remove the dust from them are driven from an off-shaft of the fan motor through a 3-hp. James speed reducer.



Fan and motor for one of the dust collectors

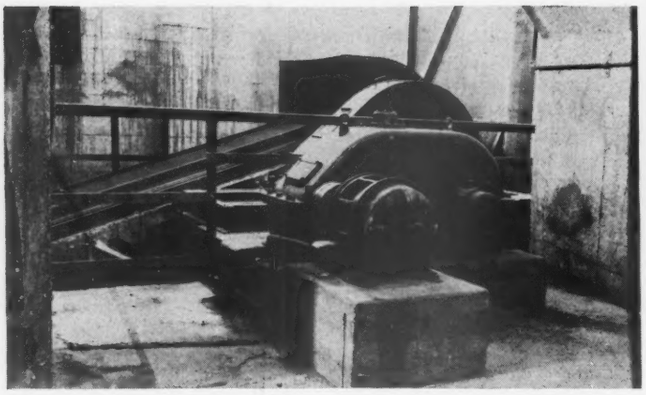
A view of a typical drive. This one is on the first clinker pan conveyor



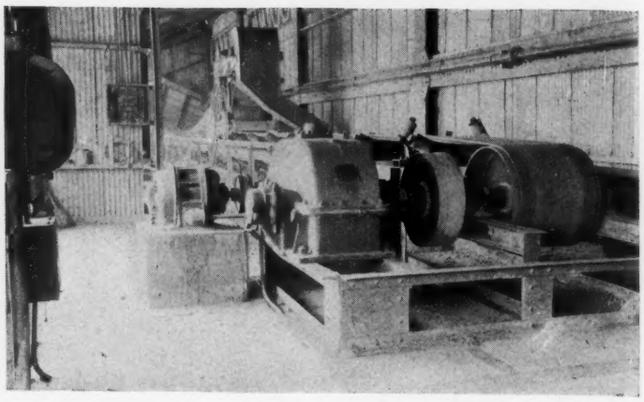
Driving arrangement of the bag cleaner

Miscellaneous Buildings

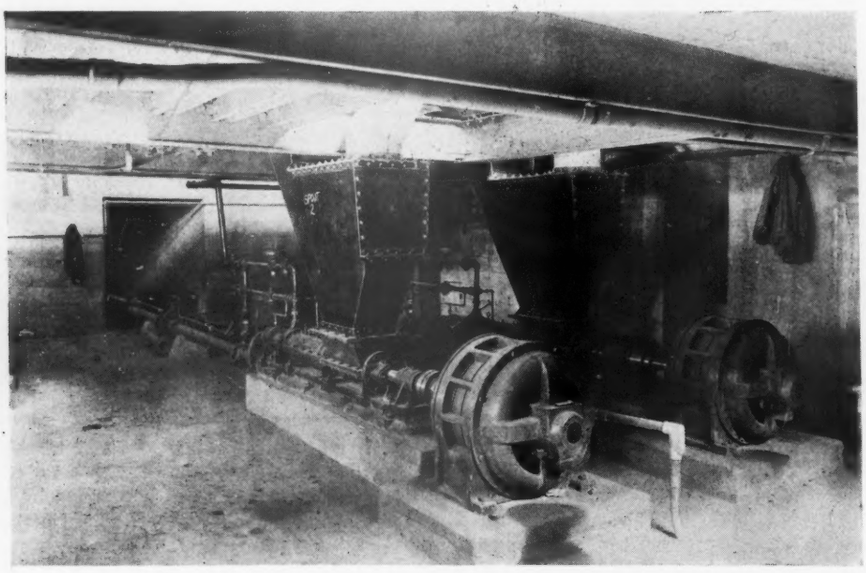
There are two important buildings heretofore unmentioned. One is referred to locally as the transformer building; the other as the machine shop. But they contain much more



Head end of the second clinker pan conveyor showing direct connected motor drive and speed reducer



Drive end of clinker belt conveyor. The clinker can be discharged either into storage or into either one of the finish grinding mills' tanks



These pumps are served from the finish mills by a screw conveyor. They pump the cement a distance of 330 ft. to the pack-house. One of the pumps is used as a stand-by

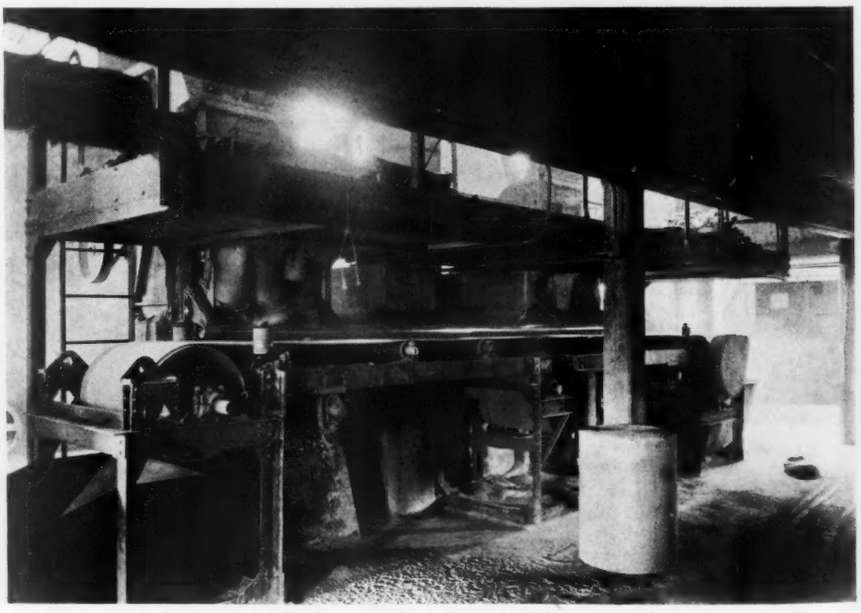
lines, both owned by the Metropolitan Edison Co. By being possessed of power from two different sources, the plant is assured of no interruption in operation caused by power failure, for it is unlikely that both lines would fail simultaneously.

The other part of the building is 42 ft. 6 in. long and houses two 23x13x16-in. Chicago Pneumatic Tool Co. air compressors with built-in Type TS synchronous motors of 300 hp. The intake line of each compressor is fitted with a large Reed air filter. The two compressors take care of the entire plant's compressed-air requirements.

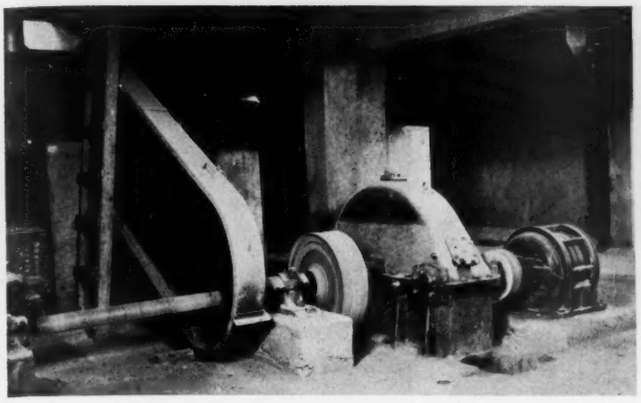
In the center of the floor of this room are two 250-kw. direct-current generators, each connected to a 375-hp. Type TS Synchronous motor. The following units are driven by 230-volt, direct-current motors: All table feeders, the double screws for feeding stack dust to the mills, double screws for coal dust to kiln feed pipe, the kilns, and the coal dryer stoker. The five grinding mills, including the coal mill, and the crusher are operated under 2300 volts and than their names imply.

The transformer building is 49 ft. wide and is divided in two. The smaller room, which is 33 ft. long, houses two oil switches and four transformers for stepping the incoming current down from 23,000 to 2300 volts. Power comes into the plant in two

The silos and packhouse. The silos have a total capacity of approximately 53,000 bbl.



Two of the four baggers at the Keystone plant

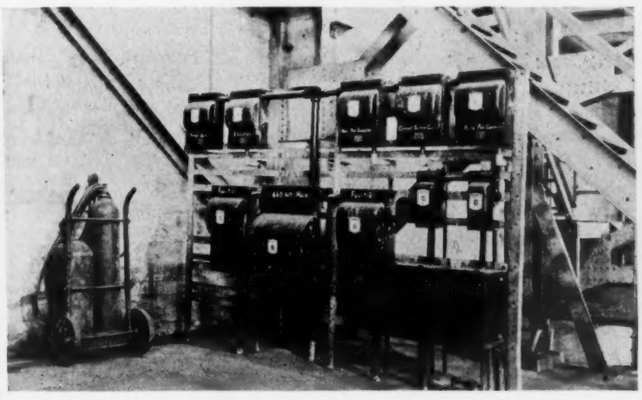


Screw conveyor drive in the pack-house

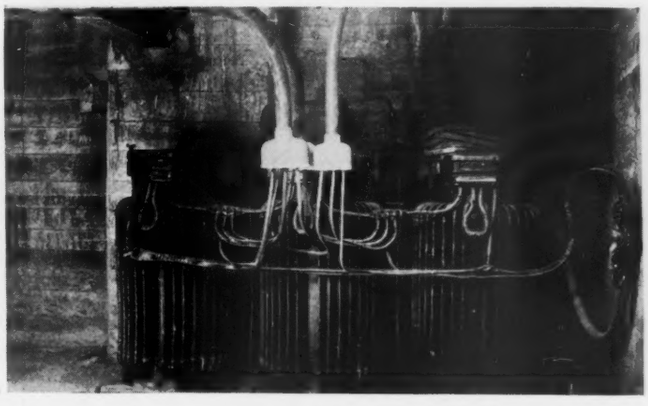
Partial view of the bag cleaner

all other motors with 440 volts. The plant has a total of 72 motors with a rated horsepower of 4760½, but the actual power consumption is considerably less than that figure, for many of the motors are on equipment which will also serve the second unit of the plant. The 20-panel switchboard, occupying one side of the compressor room, controls the distribution of power throughout the plant and incorporates the control devices for the larger motors. It was designed and built by the General Electric Co.

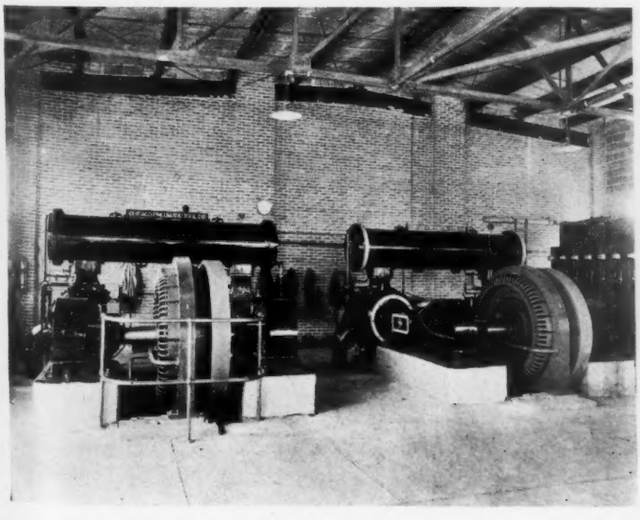
The machine shop building is 56 ft. wide and 130 ft. long. At the present time and until the permanent office is completed, the offices are under its roof, as is also the laboratory, electrical supply room and general storage for small repair parts. Also, oil is dispensed from this building, and it is worthy of note that this is done through the use of modern tanks equipped with recording



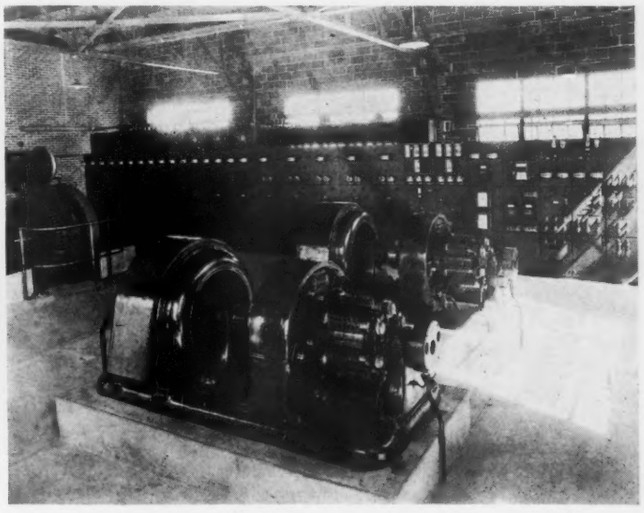
This battery of switches is typical of those throughout the plant. For such pieces of equipment as conveyors, elevators



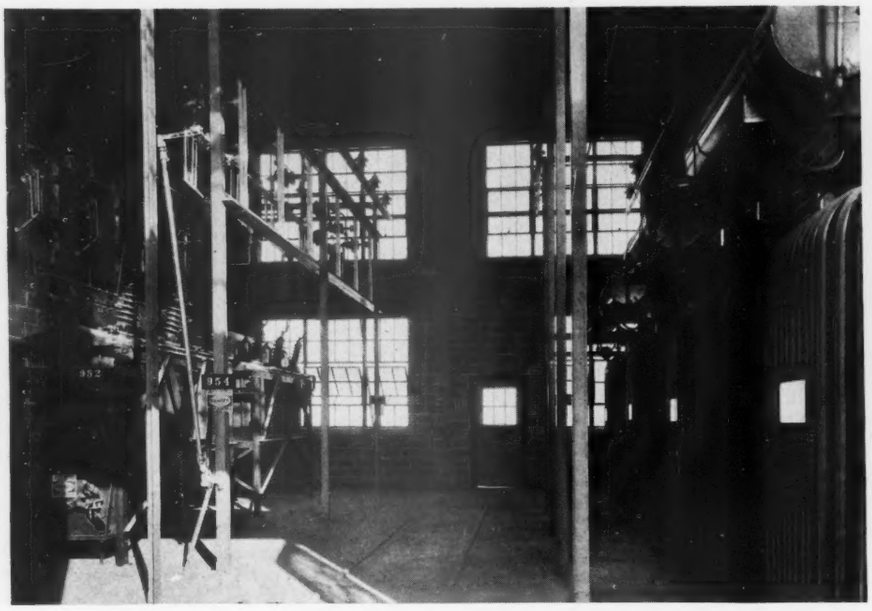
Transformers for stepping the current down from 2300 to 460 volts. These are located in the kiln room



These two compressors are located in the same room with the switchboard and direct-current generators shown in the accompanying view to the right



In the foreground are the two 250-kw. direct current generators and 375-hp. synchronous motors. The last three panels on right switchboard are for direct current

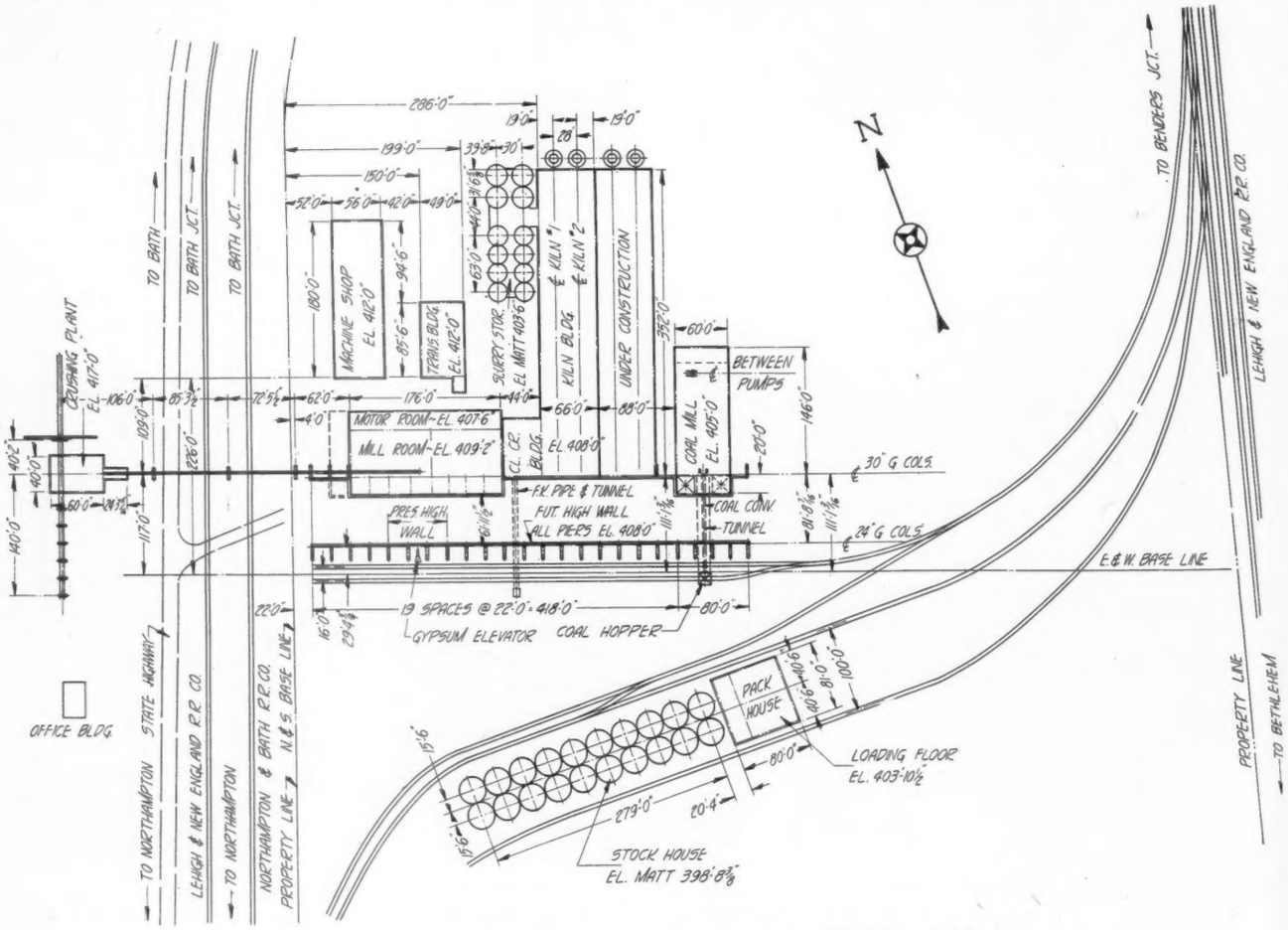


On the left are the two oil switches and on the right the four transformers which step the current down from 23,000 to 2300 volts. The transformer room occupies half of the building in which the compressors and switchboard are located

The "Keystone" brand

hand-operated pumps. The laboratory and the machine shop are well equipped with all the apparatus and machines necessary to the modern cement plant.

The plant was designed and built under the supervision of Richard K. Meade and Co., consulting engineers, Baltimore, Md., with the co-operation of Fred B. Franks and W. J. Swegman, chief engineer of the Keystone Portland Cement Co., and the engineering staff of the Polysius Corp., Bethlehem, Penn. Wm. L. Norton was the resident engineer for Richard K. Meade and Co. during construction. The M. A. Long Co., Baltimore, Md., was the general contractor. This company makes a specialty of concrete stockhouses, packhouses and slurry



General plan of the plant layout of the Keystone operation at Bath

tanks. The structural steel was fabricated and erected by the Bethlehem Construction Co., Bethlehem, Penn.

As in most other modern plants, concrete was used in its construction wherever possible. With the exception of a special roofing furnished by the Structural Gypsum Corp., New York City, on the mill building and transformer building, and Federal cement tile on the roof of the machine-shop building, all sides and roofs are covered with corrugated cement asbestos sheets and furnished by the Asbestos Shingle Slate and Sheathing Co., Ambler, Penn. In every detail and design and construction, the plant seems to be a "well-done job."

Personnel

Fred B. Franks, vice-president and general manager, is a well-known figure in the cement industry, having been chiefly responsible for the construction of the Alpha plant at Martins Creek, the old Bath Portland at Bath, and the Sandts Eddy plant of the Lehigh Portland Cement Co. Needless to say, Mr. Franks utilized in building this plant much of the experience gained in building the other ones. Just recently Mr. Franks sold the controlling interest in the Keystone company to John Barnes, Philadelphia capitalist, and one time a cement producer, who has been retired from active participation in the industry for several years. Mr. Barnes is now president of the company and he and Mr. Franks are its only executive officers.

W. J. Swegman, of late years with the Wabash Portland Cement Co., is chief engineer, and F. L. Bass, formerly with the Alpha at Martins Creek, is chief chemist.

Fewer Accidents in Stone Quarry Industry in 1927

MARKED PROGRESS was made by the stone-quarrying industry in the United States in the reduction of fatal accidents among its employees in 1927 according to reports furnished by operating companies to the United States Bureau of Mines, Department of Commerce. The death rate from accidents was lower than ever before, with the single exception of the year 1924, in which year the death rate was the same as that for 1927. The nonfatal injury rate, covering all "lost-time" injuries, was slightly higher than in the preceding year but it was lower than in any other year since 1920. The number of men employed at the quarries and the number of shifts worked by them were substantially the same as in 1926. The average employee worked the same number of days in 1927 as in the year before.

Reports from the operators showed 91,517 men employed in the calendar year 1927, who worked 24,782,561 man-days, an average of 271 work days per man. One hundred and thirty-five deaths and 13,459 injuries from accidents were reported. As compared with 1926 these figures showed an increase

Fred B. Franks

of 371 employees, 74,161 shifts, and 258 injuries. There was a decrease of 19 in the number of fatalities. Accidents during the year represented a death rate of 1.63 and an injury rate of 162.92 per thousand 300-day workers as compared with a death rate of 1.87 and an injury rate of 160.28 in 1926.

Operations inside the quarry pits employed 49,549 men who worked 12,426,312 days, an average of 251 days per man. Accidents to these employees killed 99 men and injured 8,015, resulting in a fatality rate of 2.39 and an injury rate of 193.50. In the year 1926 the reports show 50,620 men, employed inside the quarry, who worked 12,812,387 shifts, an average of 253 days per man. There were 110 deaths and 8,006 injuries in 1926 with corresponding rates per thousand 300-day workers of 2.58 and 187.46, respectively. All of the figures indicate a decrease for the year 1927 with the exception of the number injured and its corresponding rate.

"Outside" the quarries, at crushers, mills, rock-dressing plants, etc., the employees numbered 41,968, an increase of 1,442; 12,356,249 man-days, an increase of 460,236. The average work days per man was 294 for both 1927 and 1926. While the fatalities decreased from 44 in 1926 to 36 in 1927, with the fatality rates decreasing from 1.11 to 0.87, the non-fatal injuries increased from 5,195 (with a rate per thousand employed of 131.01) to 5,444 and a rate of 132.17.

Quarries are classified by the Bureau of Mines according to the kind of rock produced, as follows: Cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock. The cement-rock quarries showed a slight increase in the number of men employed, as did granite, limestone, marble, and trap rock. The average days worked by the cement men was less than in 1926, and there was also a decrease in the aggregate number of shifts worked by the employees. The number of shifts worked at slate quarries and the number worked at sandstone and bluestone quarries were less than in 1926; and there was also a decrease in the number of men employed. There was a sharp decline in both the number of fatalities and injuries in the cement plants in 1927 as compared with the previous year; the reports for the other quarries showed little differences between the two years 1926 and 1927.

The principal causes of accidents inside the quarries were handling rock at the face, flying objects, falls or slides of rock overburden, haulage, and machinery. Accidents at outside plants were due mainly to flying objects, machinery, falling objects, haulage, and hand tools.

British Building 72x48-in. Jaw Crusher

WHAT is probably the largest jaw crusher yet made in England is now passing through the workshops of Messrs. Vickers-Armstrong, Ltd., of Barrow-in-Furness. This crusher weighs no less than 133 tons and has an opening of 6x4 ft. for the reception of blocks of stone which may be up to as much as five tons in weight. The machine is designed to crush down to small pieces of about 6 in. in size, and it is in course of manufacture for Messrs. G. and T. Earle, Ltd., the cement manufacturers of Hull, and is required in connection with the limestone quarry now being opened out to supply raw material for their new cement works at Hope, in Derbyshire. Previous jaw crushers of this size have been imported from abroad. Another interesting item of plant in connection with Messrs. Earle's quarry at Hope will be a newly designed and electrically operated shovel.—*Contract Journal* (London, England).

Ohio Finishing Lime Manufacturers Publish Monthly

"THE FORUM" is the name of a monthly bulletin published by the Finishing Lime Association of Ohio, Toledo, Ohio. The first issue is dated August, 1928.

The Ohio association now has eight field representatives located as follows:

W. A. Miller, 1258 Builders Bldg., Chicago, Ill.

F. J. Spayth, 1403 Washington Blvd. Bldg., Detroit, Mich.

L. W. Lay, 230 Fifth avenue, No. 705, Pittsburgh, Penn.

L. A. Craig, 471 Paul Brown Bldg., St. Louis, Mo.

A. P. Bick, 622 Broadway, Cincinnati, Ohio.

E. M. Allen, 507 Fifth avenue, New York City, N. Y.

C. R. Smith, 507 Widener Bldg., Philadelphia, Penn.

W. S. Hay, 509 Bona Allen Bldg., Atlanta, Ga.

West side of Mount Franklin, El Paso, Tex., a solid block of limestone

Another view of Mount Franklin; Atlas company's lime plant in the foreground

The Rock Products Industry in a Dry Part of the Country

Much Building in Towns and Cities of the Southwest Calls for Enlarged Outputs and New Plants

By Edmund Shaw
Contributing Editor, Los Angeles, Calif.

THE WHOLE SOUTHWESTERN DESERT COUNTRY is having a building boom, and this includes not only the larger places such as El Paso, Phoenix and Albuquerque, but the little towns which were put where they are because they couldn't find anything else the land was good for, according to the old story. The boom seems to be legitimate enough, for the cause is the high price paid for all the products of this region. The dry country is a great producer and the per capita production of its scanty population in tangible forms of wealth is very high. The three C's—cattle, cotton and copper—are the principal products, and until quite recently all of them sold at or below the cost of production. Now the price of cattle is higher than ever, the cotton grown here sells at a premium and the price of copper, while it is not soaring, it is good enough so that the established mines can keep out of the red. With building going on at a good pace, the rock products and other building material industries are prospering exceedingly.

El Paso a Rock Products Center

El Paso, where the first part of this letter was written, has always been a good rock products' town. The district has been settled for 300 years. About the time the settlements of Jamestown and Plymouth were born the Spaniards were burning lime at El Paso. Up to quite recent times lime was still burned here in the old crude way, and the remains of some of these old kilns are yet to be found near Mount Franklin, north of El Paso. These kilns had to be built for each charge, an arch being set up, above which the kiln was built of blocks of limestone and filled with the rock to be burned. After burning the lime was recovered by tearing down the part of the kiln above the arch.

From such small beginnings the industry has grown until it includes a portland cement plant, several lime kilns, a good sized crushed rock business and a feeble sand and gravel production. There are even branches of the industry which are peculiar to the place. One is the recovery of the heavy slag from the lead and copper smelters near the city for railroad ballast and other purposes, and another is the manufacture of a very good brick from the cinders and the waste of lime burning in mixed feed type of kilns.

Limestone is abundant all through this region, but the great source of it is in Mount Franklin. This mountain, or a short range of mountains, runs about 18 miles straight north, beginning at the city. The south end is a tremendous block of limestone which was pushed up by an overflow of granite, until it lay on a 30 deg. slope. The accompanying sketch section which shows this is copied from a report by W. H. Weed (United States Geological Survey, Bulletin No. 178, on the tin deposits of Mount Franklin). This describes how the mountain was formed in some detail and calls it a typical mountain of the Range Basin type.

The uplift exposes a section that cuts through the strata for several hundred feet.

Southwestern Portland Cement Co.'s plant at El Paso

Sketch of the geological formation of Mount Franklin at El Paso

When the writer lived in El Paso, some years ago, the Texas oil fever struck this part of the country and some local people started to put down a well at the base of the mountain. It is said that an old prospector happened along and asked why the well was being put down, and was told that it was to find out what lay below the surface. "Well," said he, "if you really want to know what is down there, why don't you walk around and look at the other side of the hill?" The well was abandoned.

All Kinds of Limestone

A man who has burned lime here for years, and who knows the mountain well, once told me that he could find any limestone wanted from a pure high calcium stone to a dolomite, and all of each he would need for a big output. The statement while not perhaps exact, is more or less true as is shown in the following table giving the CaO and MgO contents of the principal ledges and the thicknesses. The figures are from the U. S. Geological Survey folio which covers this district:

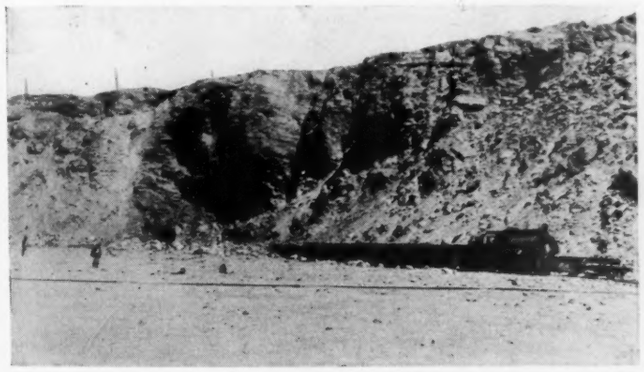
Ledge	Thickness	CaO, %	MgO, %
Comanchic	300 ft.	52.36	1.01
Hueco	3000 ft.	53.52	0.58
Fusselman	1000 ft.	28.77	18.56
Montoya	300 ft.	30.22	18.01
El Paso	100 ft.	32.12	16.00

The older limestones contain the most MgO. The Hueco ledge, which has the highest CaO content and the greatest thickness, is of the most importance commercially, as it supplies the material for the rock products industries of the place, including the crushed stone and flux quarries.

Southwestern Cement Plant

The portland cement plant at El Paso is the El Torro plant of the Southwestern Portland Cement Co., which has plants also in California and Ohio. It is a dry-process plant, very well built and equipped (it was described in Rock Products in 1922). The writer described the improvements that were being made at the time in an editorial letter in 1925. On this present visit the principal improvement noted was the installation of a large Cottrell electrical precipitation system for collecting the dust. H. E. Nichols, the superintendent at El Paso, said that the in-

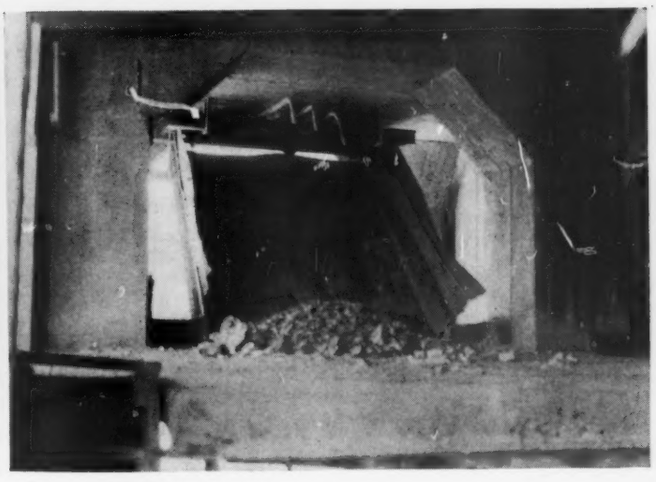
Electro-static dust precipitators recently installed at cement plant



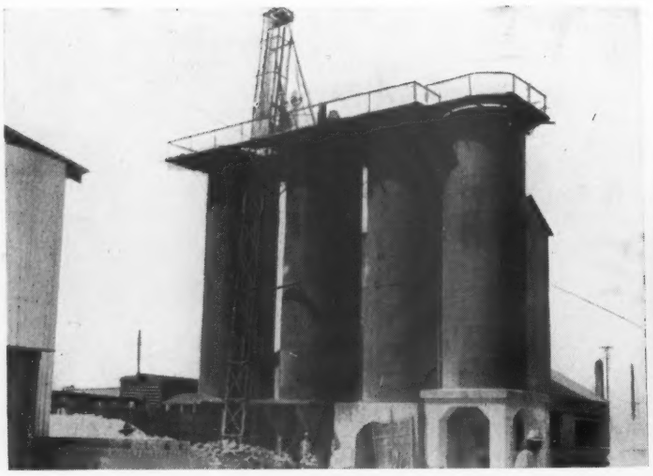
Limestone quarry of the Southwestern Portland Cement Co.

Old cement rock quarry now made into little park

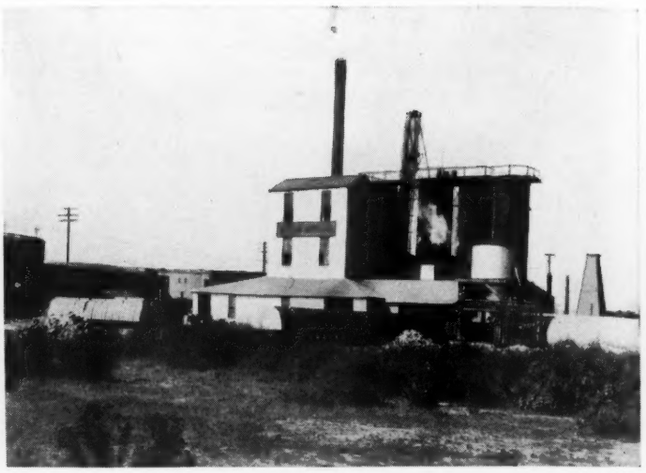
Lime kilns of the El Paso Building Material Co.



Method of drawing the lime kilns at El Paso



Lime plant of the El Paso Building Material Co.



Another view showing "klinker" brick plant

stallation was being made on the ground of economy, as it had been thoroughly proven that the dust recovered will pay for its collection. The dust problem is not so pressing from the nuisance point of view at El Paso as it is in some other places, for the plant is about three miles out of the city in a locality where the dust could not do very much damage; and when the wind blows there is so much dust from the dry country around the town that a little more would not be noticed. Under such circumstances the economy of dust recovery is all that justifies the installation. The company has a very complete system of dust collection and recovery at its plant at Osborne, Ohio, and has the experience to back up its judgment.

The cement plant has a large territory to supply, and although the population is small it uses a lot of cement in industrial buildings and dwellings. The market is really better proportionately outside than in the city, for El Paso is a "brick" town, and concrete and cement products have lagged in competition with brick, as compared with other parts of the country.

Having had considerable experience in handling Mexican labor and knowing something of the difficulty of convincing Mexicans that safety measures are really necessary, I was especially interested in the safety work at this plant. Mr. Nichols has it well organized now. A small bonus is paid for each no-accident month, and the men are divided into teams. If a man meets with an accident all the other members of his team lose their bonuses. The men not only watch themselves but they watch each other; and since this plan was adopted the accidents have notably decreased.

Of the seven cement plants in Texas this is the only one that uses coal for fuel. One of the plants at Houston burns oil and all the others burn natural gas. The coal consumption at the El Paso plant is very low, especially in two of the kilns, which are of the bottle-neck type. These show a decidedly lower fuel consumption than the straight cylindrical kiln.

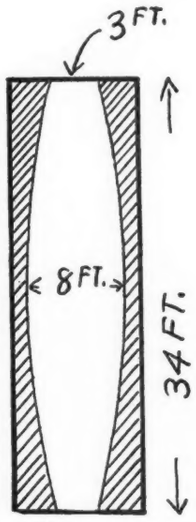
Two Lime Producers

There are now two lime producing companies in El Paso, although there was only one when I was here before. The older is that of the El Paso Building Materials Co., of which Clarence North is president and manager. A fourth kiln has been added to its battery since my last visit. The new kiln, like the others, is of the internally fired or mixed-feed type.

Mr. North is a graduate engineer and has shown ingenuity in other lines besides lime manufacturing. He is also a constant reader of Rock Products and is well informed on the later developments of kiln construction and operation. Knowing this, I asked him why he still held to a type of kiln that was considered obsolete in the United States. He explained that it was so well adapted to his particular conditions that a change to another type would be very much to his disadvantage.

Reasons for Mixed-Feed Kilns

There are a number of good reasons for this, but the main one is that he is convinced he can produce lime cheaper than with any other type of kiln. He gets a lime-fuel ratio of a little better than 5:1, which keeps his fuel cost down; for although he uses anthracite for fuel, the freight cost of other fuel would be high. He uses Mexican labor, which is very faithful, and while he cannot be put in charge of complicated machinery, a Mexican knows how to get a good product out of the familiar "pot" kiln as well as anybody. The first cost is low, and the kilns can be built locally, whereas the freight on other types of kilns and repair parts would make the cost high.



Approximate cross-section of El Paso mixed-feed lime kilns

The product of such kilns might not be satisfactory, on account of its blistered appearance, in some markets, but here it satisfies every requirement. Only the large clean lumps are sold, all the fines, ashes and overburned pieces being screened out. These form the basis of the "Klinker" brick industry, of which more will be said later. So all of the product is disposed of at a good profit.

Lime sells here at about as low a figure as at any point in the United States, $6.50 a ton in carload lots being the present price. This has not been brought about by cutthroat competition or overproduction; it is the result of conditions which the producers cannot control. In a word, about everything that is used in industry here has to be produced cheaply if it is to be sold at all.

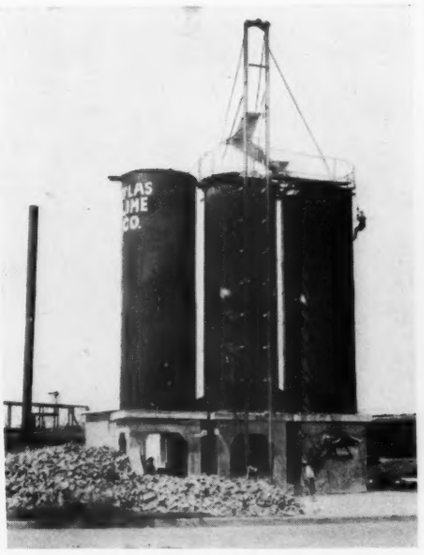
Low Costs Absolutely Necessary

There is a good example of this in the lime used in the metallurgy of copper, which is one of the principal outlets for the product of the kilns. The price of copper is fixed by the low cost mines of South America and Africa. If it is to be produced here at all it must be produced at a low cost, and that means that everything connected with production must be produced at a low cost, including lime. This goes all along the line so that the Southwest from being notably a district where high prices prevailed, as it was before the war, is now a district where

low prices prevail. I find that almost everything is considerably lower than in Chicago and Atlantic coast cities, including wages, of course.

Peculiar Kiln Design

The practice of burning lime in these kilns may interest lime manufacturers who are only acquainted with other types. It so interested W. E. Carson, of the Riverton Lime Co., Riverton, Va., when he passed through here recently, that he stopped over two or three days and sat around the kilns, weighing the stone and coal and generally familiarizing himself with the operation. The kilns are steel-plate cylinders 34 ft. high and 11 ft. in diameter outside. They are lined with a good grade of firebrick above and with clay, wire-cut brick below; and the lining lasts for two or even three years. The wire-cut brick last longer than fire brick in the cooling zone, besides being cheaper. The interior is barrel-shaped, starting at 3 ft. diameter at the top, swelling to 8 ft. at the center and narrowing to 3 ft. at the discharge gate at the bottom. The center of the burning zone is about the center of the kiln. The gradual increase in diameter from the top to this point protects the lining from abrasion and allows the charge to settle down more uniformly.



Kilns of the Atlas Lime Co., El Paso

Another view of the plant of the Atlas Lime Co.

The greater part of the air needed for combustion comes through the lime in the cooling zone. When more is needed it is admitted through small holes in the side of the kiln in the cooling zone, and enough air is admitted through these to keep the combustion even across the kiln section. The lime in the cooling zone rests on a grate made of pointed bars, and one or more of these is pulled out when lime is to be discharged. Various sorts of draw shears and other devices have been tried and abandoned in favor of this simple arrangement.

Fines and Ash Make "Klinker" Brick

The lumps of lime are forked out and stored in a warehouse or sent to cars, and the fines are piled in the yard in front of the kiln to be used in making brick. Here they are hydrated by a laborer who spreads them into a thin layer and then wets them down with a hose and afterward piles them behind him. The pile is kept large enough so that the fines stay in it for some weeks after being wet, and in that time all the hard, overburned pieces "sweat" and hydrate so that there is no danger of making an unsound brick of them. This slow curing of the fines is an important part of the brick-making process.

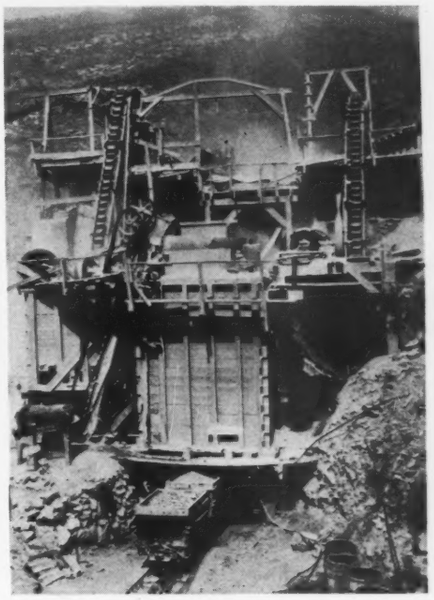
The rest of the process is about like that of making sand-lime brick, except that cinders are used instead of sand as aggregate. A description of the plant will be given in a later issue, for it is an ingenious little plant containing many ideas that might be usefully applied in plants using other processes.

The "Klinker" brick process was invented and patented by Mr. North. That lime and cinders would set up like cement had long been known, and the use of such a mixture was one of the recommendations that used to appear periodically in the farm papers 50 years ago. It was used for finishing chimneys because it made a mortar that was more resistant to the weather than sand mortar. Steam curing of course makes it much harder than setting in air. The bricks have about the same compressive strength and modulus of rupture as good concrete, and they can be sold profitably in competition with clay brick at $12.50 per M. Two companies now make them in El Paso, the other being the Atlas Brick Co.

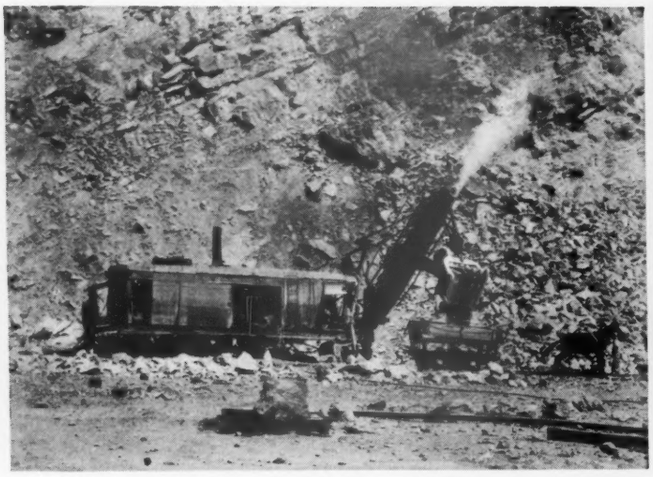
This company is a subsidiary of the Atlas Lime Co., which operates the newer lime plant in El Paso. It has three kilns, and the practice does not differ materially from that which has just been described. A difference in the method of feeding the kilns was noted, however. At the El Paso Building Material Co.'s kilns the limestone is hoisted in a skip and dumped into a car which is trammed to the kiln to be charged. At the Atlas kilns the stone is raised in a skip to a chute through which it runs by gravity to the kiln, the chute being movable so as to spread the charge evenly. Coal is charged in the same way. The president and manager of the Atlas company is Jerre Haggard.

Crushed Stone Industry at El Paso

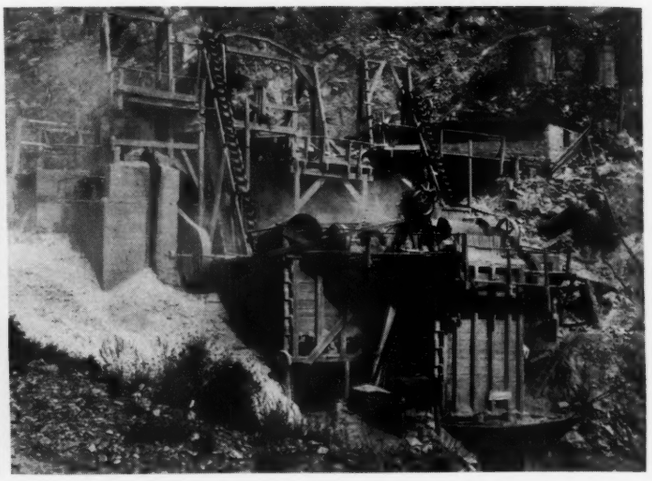
The firm of Dudley and Orr long conducted the largest crushed-stone business in the Southwest, but since my last visit it has been turned into a corporation and named



Crushing plant of the Dudley Stone Products Co. at El Paso



Quarry of the Dudley Stone Products Co.



Another view of the Dudley Stone Products Co. operation

the Dudley Stone Products Co. The officers are: J. M. Dudley, president; William Amesbury, vice-president, and L. D. Adams, secretary and treasurer. Mr. Orr retired last spring and is now in the contracting business.

A detailed description of this operation was published in ROCK PRODUCTS some years ago, but improvements and changes have been made since that time. The quarry practice interested me as being somewhat unusual, the rock being worked off in benches which lie on the strata, so that they look like a stairway, with the steps at a 30 deg. incline. Ingersoll-Rand compressed-air tripod drills are used, the air coming from a 13x18, 7½x12 compressor of the same make.

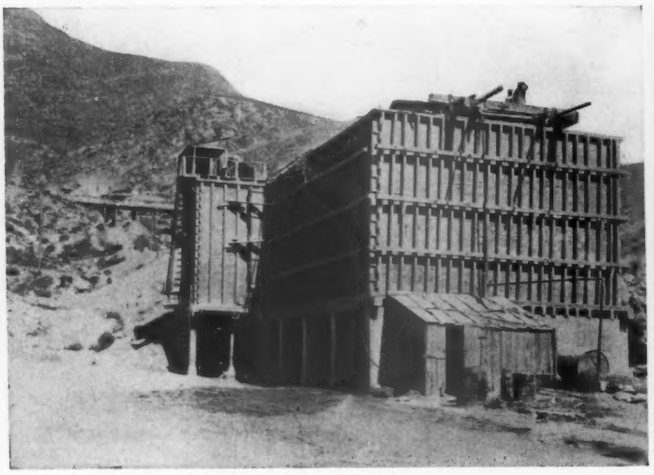
The quarry face is very high, I would say about 300 ft. at the highest point, so the quarry has not advanced very far into the mountain in spite of the large tonnage that has been removed. On this account mules can be profitably used for haulage, one mule to a 4½-yd. car. The cars run around on a practically circular track, following the face and are loaded as they pass the 2¼-yd. Marion steam shovel.

The cars are dumped to a 36x48-in. Traylor jaw crusher, fed by a short pan conveyor. The oversize is crushed in two No. 4 Telsmith and two No. 6 Allis-Chalmers gyratory crushers. All the products go to a bin at the bottom of the plant, from which they are run into cars and lowered to the delivery bins on a gravity plane, the weight of the loaded car going down bringing the empty car back.

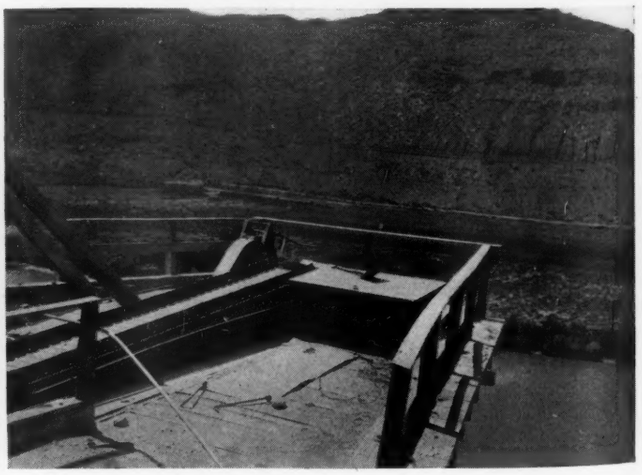
Crushing plant of A. Courchesne at El Paso

The plant is set up against the face of the mountain, which is steep at this point; and there is plenty of gravity to do all the conveying except what is needed for the return of the oversize. The bunkers, as the delivery bins are always called in the Southwest, are set on a comparatively level place below, where they can be reached by a road. An ingenious little recrushing plant is attached to them, so automatic in its operation that it runs with almost no attention. It will be described in the "Hints and Helps" section of a forthcoming number.

All deliveries are made by truck, as the consumption of crushed rock is practically confined to city paving, building and road work near the city, because at distant points it is cheaper, according to the local opinion, to crush locally with portable plants than it is to ship in material. The present production is about 1500 tons per day.



"Bunkers" of the Dudley Stone Products Co.



Loading conveyor at the A. Courchesne quarry

Screenings Sold for Concrete Aggregate

Perhaps the most interesting feature of this operation is the use that is made of the screenings, for every pound produced is sold for fine concrete aggregate. And they are sold and used unwashed. Washing was thoroughly tried out a few years ago, but it was found that the unwashed screenings made a stronger mortar. About eight years ago the writer saw some tests on this material made by an independent engineer which corroborated this. The effect of limestone dust in mortars should be a fertile subject for study, as undoubtedly in other parts of the country the washed screenings make the stronger mortar.

The only other quarry now operating on Mount Franklin is the flux-stone quarry of A. Courchesne, which produces limestone for use in the El Paso smelter. It is running at about half capacity at present, the men being employed the remainder of the time in producing a dried and ground clay which is used for lining oil wells.

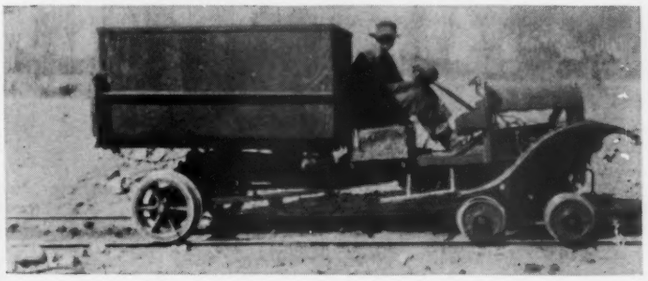
From Motor Trucks to Locomotives

This operation was described in an editorial letter from El Paso in 1925, and not many changes have been made since that time. The principal change has been the abandonment of trucks for hauling from the face to the crusher and the installation of a track and Vulcan gasoline locomotives. The change has been profitable, partly due to the longer haul that is now required.

The crushing plant, while it is small and simple, is one of the best in design and equipment that the writer has seen anywhere. Practically everything is below the level of the quarry floor, a system of pan conveyors and gravity chutes loading the material on to cars practically without attention.

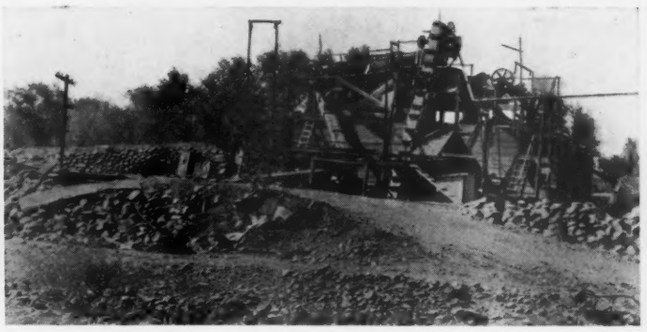
Mr. Courchesne formerly operated a washed sand and gravel plant, but found that the market would not pay for a washed product. The sand and gravel industry in El Paso is in a less developed condition than I have seen it anywhere, as it is wholly confined to pit-run production; and much of that is merely digging into the bank without much selection. Much of the sand used comes from Juarez, which is across the river in Mexico.

Plant of the Arizona Sand and Rock Co., Phoenix, Ariz.



Converted motor truck used as a railway car at Munger plant, Phoenix, Ariz.

The C. P. Munger sand and gravel pit at Phoenix, Ariz.



Plant of C. P. Munger—the pioneer sand man of Phoenix

One reason for this may be that some sand and gravel is abundant everywhere. The erosion from the hills instead of being carried away settles into basins where it is sorted by the rains. These deposits are peculiar to the dry country and are called *bolsones,* the plural of a Spanish word that means either big pocket or purse. Many of these bolsones have been worked for sand and gravel in a small way.

A decidedly novel concrete building unit has recently been introduced here, a block made by compressed air applied to the interior. The mold is loosely filled around a rubber bag which is inflated with compressed air, thus forcing the concrete against the sides of the mold and into the corners. Then the bag is collapsed and withdrawn through a hole in the end. So far it has been more of a curiosity than a commercial success.

Sand and Gravel Industry at Phoenix, Arizona

If the sand and gravel industry has been neglected in El Paso it has been developed to the highest possibility in Phoenix. There establish other branches of the industry. Entering the city from Tempe, the train passes a pair of rotary kilns that made cement for the Roosevelt dam. A company tried to use them in a commercial plant but the project failed. So far as quarrying is concerned, the only operation the writer heard of was a tufa quarry, and most of the output goes into cut stone. Onyx marble is also quarried in the locality.

The sand and gravel deposits which were seen at Phoenix are excellent, running 70 to 80% gravel. The cobbles and boulders examined were very hard and dense and the best evidence of their quality is that manganese steel has to be used in all the crushers and the bill for it is an important item in the cost sheet. Sand is short, but what there is of it is of excellent quality and it is supplemented by crushing gravel to sand size.

The largest plant is that of the Arizona Sand and Rock Co. It was built something over a year ago. It is an exceptionally well built and well managed operation, designed

There are perhaps 40,000 people in the city and considerably less than that in the small towns surrounding it. Yet this population supports three fair sized plants; and the largest and newest is running double shifts, and has been for some time.

It is really the only branch of the rock products industry in the district which is not surprising when one remembers that this is only a strip of land about 50 miles long extending for a few miles in width along the Gila river. Outside of this irrigated strip there is only desert for many miles around. Yet there have been ambitious attempts to

by John Perkins, who has built and operated gravel plants along the Pacific coast for many years. He is now engineer and operating superintendent of the company.

Two pits are operated, one chiefly for sand and the other chiefly for gravel. The latter was the original pit, but it proved to be short of sand after the water level was reached. The digging method is novel. A bucket that is like a bottomless box is drawn in at the end of a cable as an ordinary drag scraper is, but this particular design seems to work as well under water as it does in dry digging. It will be more fully described in a description of the plant to appear in a later issue.

The remainder of the plant rather follows the California practice, which is to crush the oversize and keep it separate from the uncrushed gravel. As the proportion of oversize is large, the crushing units are large for the tonnage produced and they include two gyratories, a jaw crusher and a set of rolls for crushing gravel to sand.

This is the only plant in the valley doing any railroad shipping to speak of, but by far the greater part of its output is shipped by truck. The storage and loading arrangements are excellent, two inclined belts and a shuttle belt permitting the various products to be stored separately and easily recovered. Much of the output is sold batched. At least 20 trucks are kept in service and several trucks are owned and operated by the company, although hauling is contracted for as far as possible. G. M. Kelley is president and manager of the company.

C. P. Munger Operation

The pioneer sand and gravel operation in Phoenix is that of C. P. Munger, who has operated a plant there for several years. The digging is by a Sauerman outfit, a 2-yd. scraper bucket. This is drawn to a hopper which is over a track and discharges into a Ford truck with a specially made body. The regular wheels of the truck have been taken off and replaced with flanged car wheels and arranged in this way the Ford can haul 2-yd. of wet gravel and bring it up the grade

Character of the sand and gravel deposits at Phoenix

at a good pace. The pace is slow compared to that of the return trip, however, which is made by putting the engine into reverse and letting the truck drop down the hill with the power on. Visitors with weak hearts are advised not to try it.

The run to the plant is about 1000 ft. and the truck by hustling can keep up with the output of 500 tons a day. At the end of the track it dumps to an elevator which raises the material to a revolving screen, the oversize going to a 12x20-in. Allis-Chalmers jaw crusher. The crushed product goes to the same elevator that takes the original feed.

The truck on the track may have its work supplemented by another track running on a road in front of the plant. This passes over a hopper, below which is a conveyor that takes the material to the elevator mentioned.

There is a third plant in Phoenix, that of Smidth and Hitchcock, which is used principally to crush paving material for the owners' contracts. The lack of time and the intense heat prevented me from visiting it. The official recorded temperature for the day when these notes were made was 104 deg. F.

The building boom, which is all over the dry country, is perhaps more intense at Phoenix than at any other place; and concrete is the favored material for the larger structures. For the smaller structures concrete building units have not been so successful, although there is a plant making the poured tile that is so popular on the Pacific coast, and it is reported to be doing well.

Workability of Portland Cement Pastes

THREE METHODS of tests for workability of cement pastes—the extrusion cylinder, the ball plasticimeter, and the capillary tube — were discussed in *Technical News Bulletin* of the U. S. Bureau of Standards, No. 132 (April, 1928). A fourth method, using the MacMichael viscometer with its modified "paddle," has been studied. The instrument was too small to permit the study of drier mortars. However, a summary of the results already obtained develops two items of interest. First, a comparison was made between the workability of the cements when tested as neat pastes, as shown by the MacMicheal instrument, and also as shown by the three methods of test referred to above, which were also reported in the paper published in the Proceedings of the American Concrete Institute, "Cement as a factor in the workability of concrete," Volume XXIV, 1928, pages 43-55. There was quite good agreement in this respect between the MacMichael instrument and the capillary tube reported in the earlier paper. Secondly, at least within the scope of the instrument used, the relative results of a number of cements tested as neat cement pastes, or in a mortar of a certain proportion, may not be the same as the relative results obtained when testing the same cements in a mortar of different proportions.—*Technical News Bulletin* of the U. S. Bureau of Standards.

Dumping the car-truck into boot of elevator at Munger plant

Car-truck track and pit loading hopper at Munger plant

Gravel Plant Washing and Screening Equipment and Design

Part VII—Centrifugal Pumps

By Hugo W. Weimer
Consulting Engineer, Milwaukee, Wis.

CONTINUING this series of articles (Part VI was published December 10, 1927), the writer has chosen as his subject for this part, an item that is of primary importance to the successful operation of any sand and gravel washing plant, and that is the water supply. Unfortunately, there are many operators who would have less difficulty in producing clean material if they would but study their water supply, and not only see that they have sufficient quantity, but also use what they have to the best advantage. This article will treat only on the method of supplying water and be confined to the use of centrifugal pumps for this purpose.

It is a coincidence that the development of the washed sand and gravel industry and the general use of centrifugal pumps occurred about the same time, and almost from their inception, these plants made almost general use of the centrifugal pump to obtain the necessary water supply. The present day application of the centrifugal pump is a development of the last twenty-five years, which in a measure is because of the fact that the general use of high-speed, electric motors, oil and gasoline engines during this period of time was past the experimental stage. Without these sources of power, the centrifugal pump would have little commercial value, because it is necessarily a high speed unit depending entirely on the speed of the impeller, indicated in Fig. 1 as item No. 2.

The Principle of the Centrifugal Pump

To illustrate briefly how the centrifugal pump functions, we will take the example of spilling a pail of water from the top of a building, the water falling towards the ground with increasing speed, finally striking the ground moving at a certain rate of speed. Now assuming that we wish to return this water to the top of the building, it must necessarily leave the ground at the same rate of speed at which it originally struck the earth, and it will then with decreasing speed eventually reach the top of the building. This is to illustrate that the speed of the water when leaving the pump impeller must be equal in speed or velocity to water falling from the same head as the pump is working against.

In order to determine the size of pump, power unit and pipe necessary for a certain condition, the gallons per minute and the head against which the pump will operate must be known. As to the amount of water required, this varies somewhat, but many operators figure about one gallon of water per minute for each ton of material in ten hours. The head against which the pump operates is variously termed total pump head, total net head or total dynamic head. The total head consists of the vertical height in feet from the water supply level to the point of discharge, plus the loss which is sustained by the friction of the water against the inside of the pipe and the ultimate pressure required at end of pipe.

Assuming that an operator desires to obtain a proposition from a manufacturer for a centrifugal pump installation and does not wish to figure any of the units such as pump, power and pipe himself, then it is necessary to specify the number of gallons per minute required, the vertical distance from the water supply level to the point of discharge, the horizontal distance from the pump to the

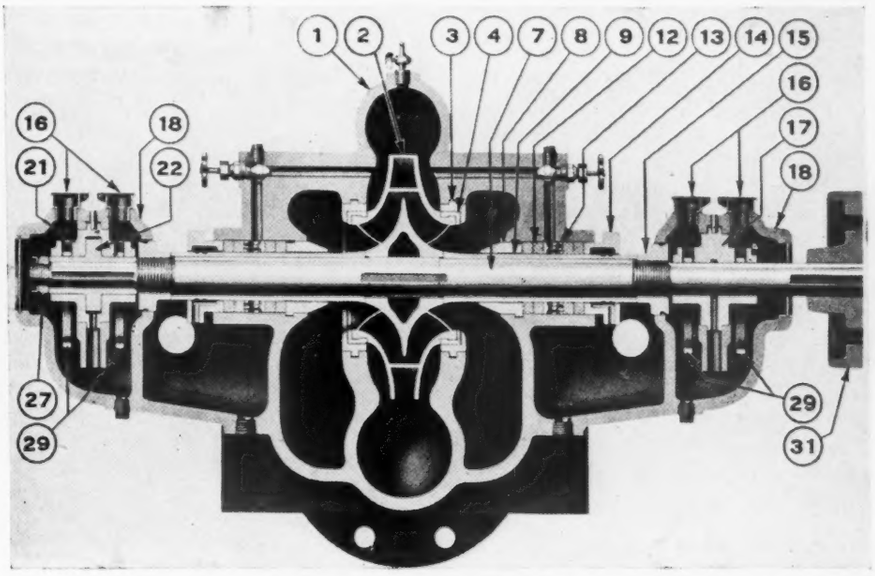


Fig. 1. A cross section of a single-stage, double suction, centrifugal pump

TABLE 1. FRICTION HEAD IN FEET OF WATER—LOSS OF HEAD DUE TO FRICTION OF WATER PER 100 FT. OF PIPE—AND VELOCITY OF WATER IN FEET PER SECOND—WITH GALLONS PER MINUTE AND SIZE OF PIPE GIVEN

Gallons per minute	Size of Pipe (Diameters) 2-in. Vel.	2-in. Fric.	3-in. Vel.	3-in. Fric.	4-in. Vel.	4-in. Fric.	5-in. Vel.	5-in. Fric.	6-in. Vel.	6-in. Fric.	8-in. Vel.	8-in. Fric.
50	5.11	9.9	2.27	1.38	1.28	0.34	.....	.....	.....	.....	.....	.....
100	10.21	35.8	4.54	4.96	2.55	1.22	1.63	0.41	1.14	0.14	.....	.....
150	.....	.....	6.8	10.5	3.84	2.55	2.45	0.88	1.71	0.32	.....	.....
200	.....	.....	9.08	17.8	5.11	4.40	3.27	1.48	2.28	0.62	.....	.....
250	.....	.....	11.32	27.2	6.40	6.72	4.08	2.24	2.80	0.92	1.60	0.22
300	.....	.....	13.62	38.0	7.66	9.30	4.90	3.14	3.40	1.29	1.90	0.32
350	.....	.....	.....	.....	8.90	12.32	5.72	4.19	3.98	1.75	2.20	0.42
400	.....	.....	.....	.....	10.21	16.0	6.54	5.40	4.54	2.21	2.60	0.54
500	.....	.....	.....	.....	12.77	24.0	8.17	8.12	5.60	3.30	3.20	0.82
600	.....	.....	.....	.....	.....	.....	9.80	11.30	6.72	4.70	3.84	1.14
700	.....	.....	.....	.....	.....	.....	11.44	15.10	7.84	6.20	4.46	1.54
800	.....	.....	.....	.....	.....	.....	.....	.....	9.08	8.00	5.12	1.97
900	.....	.....	.....	.....	.....	.....	.....	.....	10.30	10.11	5.75	2.46
1000	.....	.....	.....	.....	.....	.....	.....	.....	11.32	12.04	6.40	3.02

discharge point, the approximate number of elbows or fittings required and the pressure wanted at end of pipe. Knowing the layout of the proposed installation, all these data are available and do not require any calculating other than taking or assuming a few measurements. As to the ultimate pressure required at the discharge point, this can be assumed at a figure of 5 to 10 lb.

To assist those who might wish to determine the pump, horse power and size of pipe required for certain conditions, or to illustrate how these items are figured, the writer has prepared Tables 1 to 5 inclusive, which data are necessary for these calculations.

Use of Tables

Table 1 is useful for two purposes—first to determine the velocity of water through a certain size of pipe and second to show the loss of friction head in feet per 100 ft. of pipe. There is a certain velocity that is the most economical to use and will be stressed on later in this article. The velocity of the water passing through the discharge opening of a centrifugal pump is about 10 to 12 ft. per second; however, in the discharge line which is usually larger in diameter than the discharge opening of the pump, good practice is to figure about 8 ft. per second. The suction pipe of a centrifugal pump is often one to two sizes larger in diameter than the discharge pipe, because the velocity of the water in the suction pipe should be approximately only 4 ft. per second.

The second purpose of Table 1 is to give the friction head due to the friction of water in the pipe, which is required to obtain the total head against which the pump must operate. This is given in head feet for each 100 ft. of pipe for various diameters and gallons per minute.

TABLE 2. FRICTION HEAD FOR PIPE FITTINGS EQUIVALENT FEET OF STRAIGHT PIPE

Fitting	Size of Pipe or Fitting 2-in.	3-in.	4-in.	5-in.	6-in.	8-in.
Check valve	7	10	13	17	20	26
Gate valve	3	4	5	7	8	11
90 deg. elbow	7	10	13	17	20	26
45 deg. elbow	4	5	7	9	10	13

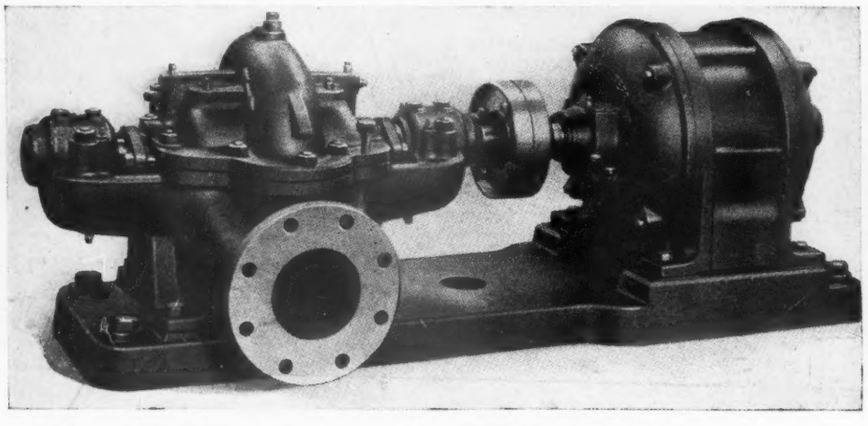


Fig. 3. A single-stage, double suction centrifugal pump like the one shown in section in Fig. 1

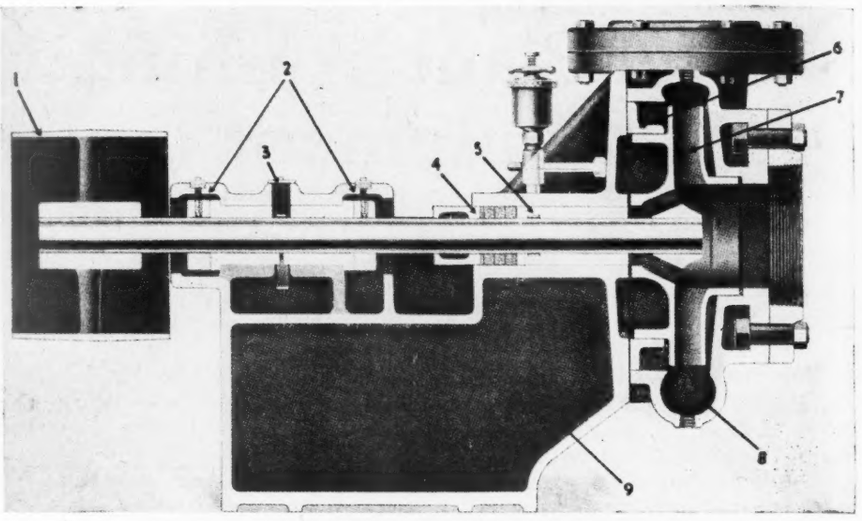


Fig. 2. A sectional view of a single-stage, single-action, belt driven centrifugal pump

Each pipe fitting, such as an elbow or valve, represents additional friction over and above that caused by water flowing through a straight pipe. Table 2 shows the approximate allowance to be made for each of these items for the various diameters of pipe. Table 3 shows the number of feet in head, it is necessary to allow for pressures from 5 to 20 lb. at the discharge end of the pipe.

It is common practice for manufacturers to recommend that the suction lift should not be greater than 15 ft., which figure is the vertical distance from the center line of the pump to the water supply level, plus the pipe friction, including an elbow and a foot valve. Table 4 has been prepared to show at a glance the maximum vertical distance from pump to water level, based on the maximum of a 15-ft lift. The reader will note that allowance has been made for 10 ft. of horizontal line, one elbow and foot valve with strainer. It will be noted that for most installations, if the distance from pump to water does not exceed 10 ft., no trouble will be experienced, although it is always good practice to keep this figure at the minimum.

It must be remembered that there is a very definite limit to the suction lift and that all unnecessary bends must be avoided, and as stated before, the diameter of this pipe should in most cases be larger than the discharge pipe. The theoretical suction lift at sea level, not taking into consideration any friction loss, is 34 ft., and this theoretical figure would be reduced to about 22 ft. if the friction loss were to be deducted. Even to accomplish this, the installation would have to be perfect in every respect and consequently manufacturers have practically set the limit at 15 ft. for the ordinary installation. The end of the suction pipe should not be less than 4 ft. below water level for the average installation and preferably more.

TABLE 3. PRESSURE HEAD IN FEET OF WATER—HEAD REQUIRED FOR PRESSURE AT DISCHARGE

Pounds Pressure	Head in Feet Required
5	12
10	23
15	35
20	46

TABLE 4. SUCTION PIPING MAXIMUM VERTICAL DISTANCE FROM PUMP SUCTION TO WATER LEVEL—BASED ON USING APPROXIMATELY 10 FT. OF HORIZONTAL LINE AND ONE ELBOW AND FOOT VALVE WITH STRAINER IN FEET

Gallons per minute	Size of Pipe 3-in.	4-in.	5-in.	6-in.	8-in.	10-in.
50	14	14	....	....	....	....
100	13	14	14	14	....	....
150	11	13	14	14	....	....
200	8	13	14	14	....	....
250	4	12	14	14	14	....
300	....	10	13	14	14	....
350	....	9	13	14	14	....
400	....	7	12	13	14	....
500	....	4	10	13	14	14
600	....	....	9	12	14	14
700	....	....	7	11	14	14
800	....	....	....	10	13	14
900	....	....	....	9	13	14
1000	....	....	....	7	13	14

In all cases, a strainer should be placed at the intake end, and a good method is to use a combination foot valve and strainer as illustrated in Fig. 5 for such permits of keeping the pump primed at all times. By using this foot valve, it is unnecessary to have any other valve at or near the pump, as it only causes an additional friction loss. The valves at the discarge point are usually sufficient, except for extremely long lines or large installations.

Knowing the total head against which the pump will operate and the gallons per minute, Table 5 can be referred to in order to obtain the horsepower required for the driving unit. The theoretical power required, not taking into consideration any efficiency loss, is termed the water horsepower, and this figure is obtained by multiplying the gallons per minute times the weight of water in pounds per gallon, times the total head and divided by 33,000, which is the number of foot pounds in one horsepower. This formula is as follows:

$$\text{Water hp.} = \frac{\text{g.p.m.} \times 8.3 \times \text{head}}{33{,}000}$$

or

$$\text{Water hp.} = \frac{\text{g.p.m.} \times \text{head}}{3960}$$

No centrifugal pump will operate at 100% efficiency; therefore, the actual or brake horsepower is always greater than the water horsepower. The writer cannot give an exact figure as to the efficiency of all centrifugal pumps, but has assumed in preparing Table 5 an efficiency of 60%, which is a safe figure to use for the purpose of this article. The formula for determining the actual or brake horsepower which allows for the inefficiency of the pumping unit, would be as follows:

$$\text{Actual hp.} = \frac{\text{g.p.m.} \times \text{head}}{3960 \times 0.60}$$

TABLE 5. ACTUAL HORSEPOWER REQUIRED WITH GALLONS PER MINUTE AND TOTAL HEAD GIVEN, BASED ON PUMP HAVING 60% EFFICIENCY

Gallons per minute	Total Net Head in Feet of Water												
	40	60	80	100	120	140	160	180	200	250	300	350	400
50	0.85	1.3	1.7	2.1	2.5	3.0	3.4	3.8	4.2	5.3	6.3	7.4	8.4
100	1.7	2.6	3.4	4.2	5.0	6.0	6.8	7.6	8.4	10.6	12.6	14.8	16.8
150	2.6	3.9	5.1	6.3	7.5	9.0	10.2	11.4	12.6	15.9	18.9	22.2	25.2
200	3.4	5.2	6.8	8.4	10.0	12.0	13.6	15.2	16.8	21.2	25.2	29.6	33.6
250	4.3	6.5	8.5	10.5	12.5	15.0	17.0	19.0	21.0	26.5	31.5	37.0	42.0
300	5.1	7.8	10.2	12.6	15.0	18.0	20.4	22.8	25.2	31.8	37.8	44.4	50.4
350	6.0	9.1	11.9	14.7	17.5	21.0	23.8	26.6	29.4	37.1	44.1	51.8	58.8
400	6.8	10.4	13.6	16.8	20.0	24.0	27.2	30.4	33.6	42.4	50.4	59.2	67.2
500	8.5	13.0	17.0	21.0	25.0	30.0	34.0	38.0	42.0	53.0	63.0	74.0	84.0
600	10.2	15.6	20.4	25.2	30.0	36.0	40.8	45.6	50.4	63.6	75.6	88.8	100.8
700	11.9	18.2	23.8	29.4	35.0	42.0	47.6	53.2	58.8	74.2	88.2	103.6	117.6
800	13.6	20.8	27.2	33.6	40.0	48.0	54.4	60.8	67.2	84.8	100.8	118.4	134.4
900	15.3	23.4	30.6	37.8	45.0	54.0	61.2	68.4	75.6	95.4	113.4	133.2	151.2
1000	17.0	26.0	34.0	42.0	50.0	60.0	68.0	76.0	84.0	106.0	126.0	148.0	168.0

An Example

In order to illustrate how these tables may be used, we will assume a problem as shown in Fig. 6, knowing before we start our calculations that 600 gal. of water per min. (g.p.m.) are required to be delivered to a point 40 ft. above the pump level, and at a horizontal distance of 1000 ft. from the pump to the point of discharge, and that about 10 lb. pressure is required at the discharge point, and that the pump will be placed approximately at water level.

By referring to Table 1, we find that 600 gal. of water per min. can be run through a 6-in. pipe with a velocity of 6.72 ft. per sec. We choose this size of pipe for the discharge line because we wish to keep under a velocity of 8 ft. per sec. For the suction pipe, the next larger standard size would be 8 in., and this is suitable because the velocity will be less than 4 ft. per sec. We now have determined on the size of pipe and can proceed to figure the total head. From Table 4, we find that with 600 gal. per min. and an 8-in. pipe, the center line of pump can be placed 14 ft. above water level. In order to figure the maximum condition at this point, we will use 14 ft. for this distance and place the intake end 4 ft. below water level. We can, therefore, use 15 ft. for our suction lift, which takes care of everything up to the pump. The static head, or vertical distance from the pump to the discharge point, is 40 ft. The pipe friction head will consist of 1000 ft. of horizontal line, 40 ft. of vertical lift, and an allowance of 40 ft. for two elbows, making a total of 1080 ft. of pipe for which the friction must be allowed, or 10.8 times 4.7, which is 51 ft. of friction head. This information is obtained from Tables 1 and 2. The head required for the ultimate pressure is shown in Table 3 and for this case would be 23 ft.

This information we will tabulate as follows, which gives us the total head required against which the pump will operate:

Fig. 5. A combination foot valve and strainer

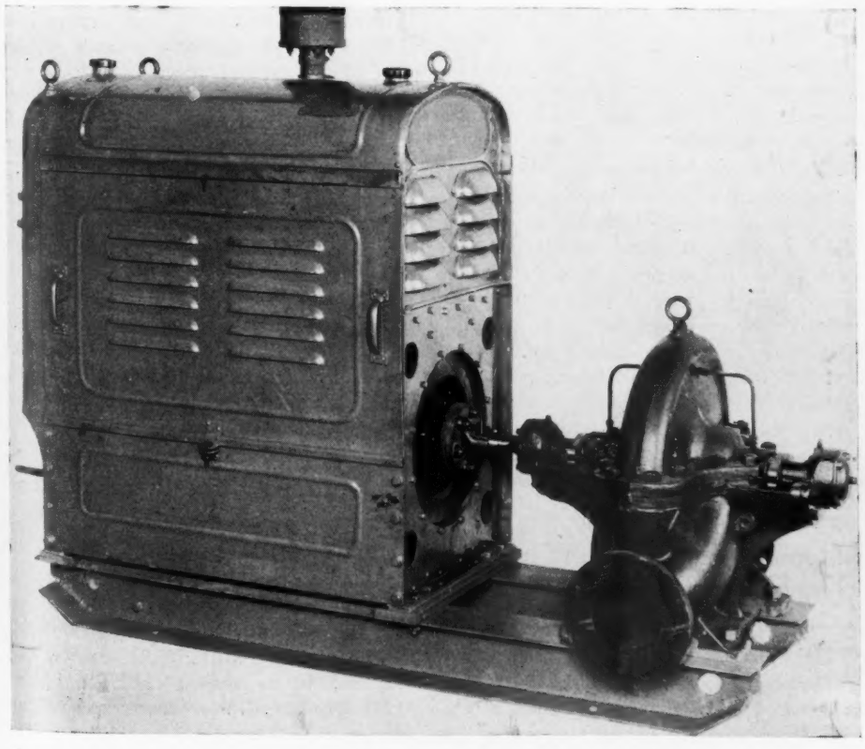


Fig. 4. A compact arrangement of a pump direct connected to a gasoline power unit

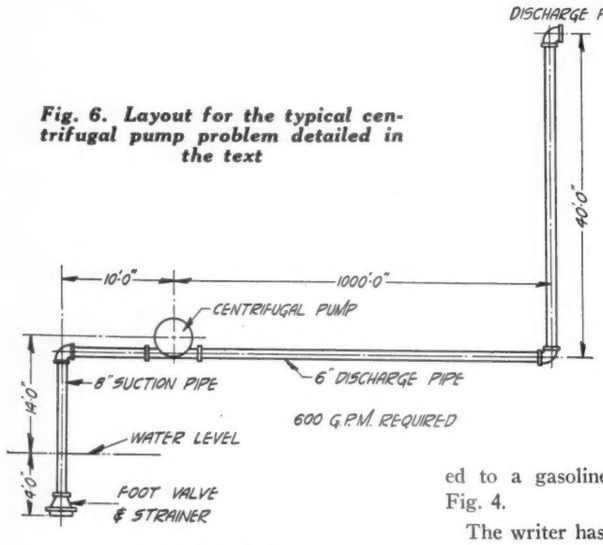


Fig. 6. Layout for the typical centrifugal pump problem detailed in the text

TOTAL HEAD

Suction lift	15
Static head	40
Pipe friction	51
Ultimate pressure	23
Total	129 ft.

Using the figures of 600 gal. per min. for capacity and a total net head of 129 ft., we note by referring to Table 5 that 30 hp. is required for a 120-ft. head, which is the closest figure given. The horsepower we will require will be somewhat more and probably about 33. If this pump is to be driven by an electric motor, we would add about 10% to our figure, which would mean in this case a 35-hp. motor. If, however, we drive this pump with a gasoline motor of the usual enclosed industrial type, we would add about 20% to our requirements, which means a power unit that would be rated at 40 hp.

We have thus determined that for a problem as shown in Fig. 6, we would use a 6-in. discharge line, an 8-in. suction pipe, and that the power unit would be a 35-hp. electric motor or a 40-hp. gasoline-engine unit. If the power unit were to be direct-connected to the pump, the installation for an electric motor would be similar to that shown in Fig. 3, and the speed of the motor would be 1140, 1730 or 3500 r.p.m., which are standard speeds for 60-cycle, a.c. motors. The 1750-r.p.m. motor is very commonly used. If the pump is to be direct-connected to a gasoline power unit, the installation would be similar to that shown in Fig. 4. The speed of these gasoline motors is usually about 1,000 to 1,200 r.p.m. It is, of course, possible to use a belt drive from the power unit to the pump, but the direct-connected units are so compact and satisfactory in every respect, that it is seldom good policy to use any other method of driving. As to the size of pump required, we will have to leave this entirely up to the pump manufacturers. So many factors enter into the construction operation and efficiency of a centrifugal pump, that the writer cannot possibly prepare a table that would be of any value.

A cross-section of a single stage, double suction centrifugal pump is shown in Fig. 1, and an exterior view of this pump is shown in Fig. 3. This pump is arranged for direct connection to the power unit. In Fig. 2, a cross-section of a single-action, single-stage, belt-driven centrifugal pump is shown. A very good arrangement for a pump direct-connected to a gasoline power unit is shown in Fig. 4.

The writer has mentioned in the fore part of this article that there is a certain velocity of water when passing through the pipe that is the most economical to use; and to illustrate this point, we will again refer to Fig. 6, and to the hypothetical installation. By using a 6-in. discharge line for 600 gal. per min., we have a velocity of 6.72 ft. per sec., with a friction head of 4.7 ft. per 100 ft. of pipe, and the net result of the total head was 129 ft., requiring either a 35-hp. electric motor or 40-hp. gasoline unit. Had we chosen a 5-in. discharge pipe for this installation, the velocity would have been 9.8 ft. per sec. and the friction head 11.3 ft. This would bring the actual horsepower requirement up to 48 hp. as against 35 hp. for a 6-in. pipe, and would require not less than a 50-hp. electric motor or 60-hp. gasoline unit. While it is true that the larger pipe would cost more, the difference is only about $200 for the entire length of pipe required, whereas the pump and power unit for the 5-in. pipe would cost approximately $600 more than the units for the 6-in. pipe; and in addition to this, there would be a daily cost of more electric power or gasoline, as the case may be.

This comparison is not at all exaggerated, and while it is true that there is no mystery about a centrifugal pump installation, care must be taken in the selection of the various units. It is the purpose of this article to enlighten the reader on this point, and in a simple way attempt to submit information and data tables that will at least permit of checking roughly proposed centrifugal pump installations for sand and gravel washing plants.

(To be continued.)

Shipments of Canadian Gypsum Established New High Record in 1927

THE 1927 shipments of gypsum from Canadian deposits totalled 1,063,117 tons valued at $3,251,015 and established a new high record for the industry, according to finally revised statistics just issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa. In 1926, the production amounted to 883,728 tons worth $2,770,813. Gypsum quarried during 1927 totalled 1,105,704 tons of which quantity 196,232 tons, or 17.7% was calcined in Canada.

Quarries in Hants, Inverness, Victoria and Nova counties, in Nova Scotia; Albert and Victoria counties, in New Brunswick; near Paris, Ont.; Gypsumville, Man.; and Falkland and Mayook, B. C., were active during 1927.

Canadian crude gypsum exported amounted to 588,808 tons in 1927; this tonnage was shipped to the United States. Ground gypsum and prepared wall plaster exported during the year totalled 6556 tons. The United States, New Zealand, Australia and Newfoundland were the principal importers of these materials.

The 19 firms operating in this industry reported an actual capital investment of $9,055,624 in 1927. Employment was furnished 63 salaried employes, 973 mine workers and 391 mill workers; their total earnings were $1,311,688. The cost of fuel used during the year was $137,939, while the electric power consumed accounted for a further outlay of $60,260. Primary power equipment consisted of 160 units with a combined rating of 7732 horsepower.

The advances made in the gypsum industry in Canada since 1926 have been quite marked, the value for the total output for 1927 showing an increase of nearly half a million dollars over that of the previous year. The output of crude rock in the Maritime Provinces shows a decided increase but probably the most important developments in this industry have taken place in the products manufactured from gypsum. A number of years ago only a small proportion of the gypsum mined in Canada was calcined in the country. In 1927 approximately 192,000 tons were calcined and made into wall plaster, gypsum wall board, gypsum blocks and insulating material.

The export trade for calcined gypsum and gypsum products is well worthy of serious study. Shipments are already being made from the Maritime Provinces and British Columbia to New Zealand and points in the Orient, and there appears no reason why these export markets should not increase and be extended to the British West Indies and possibly to some of the countries of South and Central America.

Dominion Lime Production Gains

PRODUCTION of lime in Canada established a new high record in 1927, advancing 7.5% in quantity and 3.8% in value over the 1926 production. The 1927 shipments amounted to 12,707,221 bu. valued at $3,923,388, as against 11,825,736 bu. at $3,781,484. Canadian producers received an average of 28.9 cents per bushel for quicklime and $11.81 per ton for hydrated lime.

Sand Settling and Devices for Settling and Classifying Sand

Part X.—Modern Free Settling Classifiers Employing Rising Currents of Hydraulic Water

By Edmund Shaw
Editor, Rock Products

CLASSIFIERS of the conical and pyramidal forms, employing rising currents of hydraulic water, are very old and a great many variations of this simple machine have been built. They were first used in plants where ore was crushed and treated, and generally were fed with only a few tons per hour, and under such conditions their work was satisfactory. But as larger tonnage plants were built it was necessary to build so much larger forms, or to use such great batteries of small classifiers, that an impossible amount of space and of attention was required. Consequently there had to be a redesigning of classifiers and an evolution of new forms, some of which will be described in this number, and the others in a subsequent one.

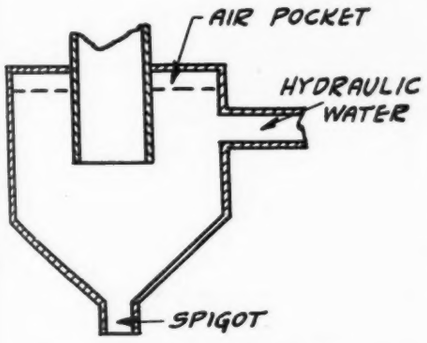


Fig. 44. Fitting for giving an even flow to the sorting column

The rapid development of vibrating and shaking screens has given classification a new place in modern plants. It is not so much used for separating into definite sizes as for roughing off before other machines, such as screens or dryers, where the screening is to be done after drying. It is also used where materials of two specific gravities are treated so as to separate by weight rather than by size.

Renewal of Interest in Hydraulic Classification

In the last few years there has been a renewed interest in classification and several investigations of its possibilities and limits have been made. One of the most important was made by A. J. Fahrenwald while studying the concentration of lead ores in the Coeur d'Alene district for the U. S. Bureau of Mines. He found that most of the older ideas about hydraulic classification were wrong. The old idea of a long sorting column appeared to be a mistake as he showed that practically all the separation was made in a plane just above the mouth of the sorting column. He also found that the uniform density of pulp, the proportion of solids to liquids, varied so much that anything like uniform separating into sizes was impossible with the older machines of the hydraulic water type. In addition he noted the ever present trouble that came from the accumulation of solids on the side of the cone or pyramid that formed the body of the machine.

Out of Mr. Fahrenwald's work came the invention of the Fahrenwald sizer, which will be described in a succeeding number of this series. The present number will describe some other methods by which investigators have endeavored to overcome some of the difficulties encountered, as better work was demanded of classifiers.

One of the first difficulties met was that of admitting the hydraulic water to a sorting column so that the current in the column would be uniform. Three different methods have been found by which this condition may be improved. The earliest discovered was to let the water into a chamber around the sorting column, with a space above for an air chamber; the air in this being compressed will impart an equal pressure to all parts of the water and send a current through the sorting column that has the same velocity in all parts of its cross-section. It is shown in Fig. 44.

Prof. Richards introduced a whirling current in what he called his vortex classifier. The swirl of the current moving upwardly through the column wiped out the eddy currents and gave a fairly even velocity throughout the column. It is shown in Fig. 45.

Prof. Richards also introduced a pulsating current, obtained by opening and shutting the valve admitting the hydraulic water 300 to 400 times per minute. But this was principally applied to a hindered settling classifier, which will be described in a forthcoming number.

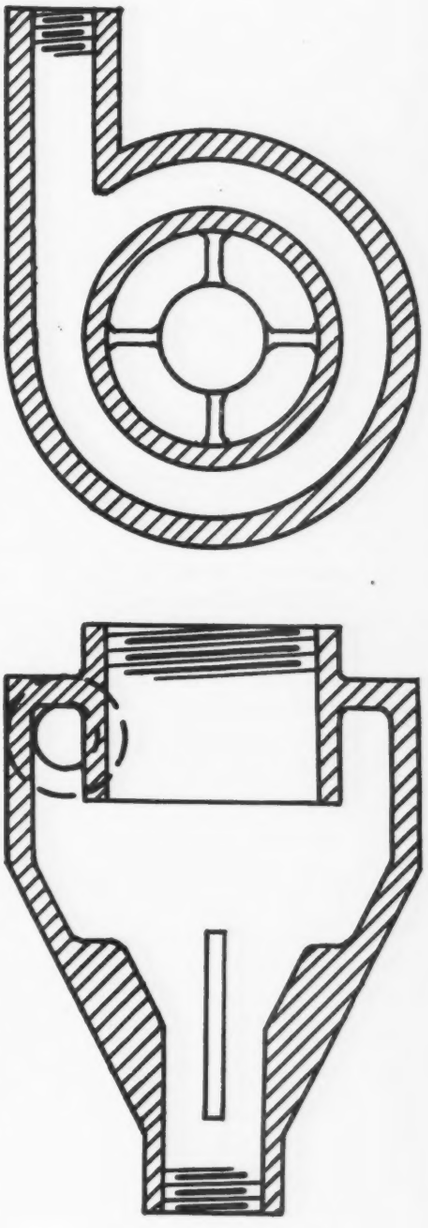


Fig. 45. The Richards vortex fitting

Preventing Material from Adhering to the Side

The reasons why material adheres to the sides of cone and pyramidal classifiers was given in Part II, March 3, 1928, discussing elementary forms of classifiers. Its prevention has not been an easy problem to solve. One of the methods found has been that of reversing the current so that the coarse material would fall down along the sides and prevent the fine material from accumulating there. The downward current also prevented

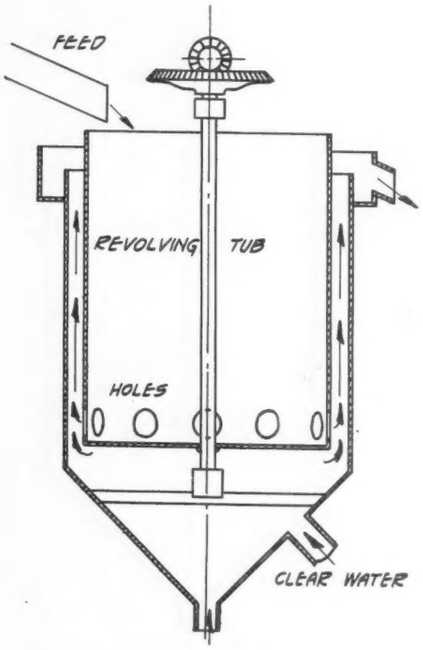


Fig. 47. Diagram of iron ore washer with revolving tub and reversed flow

the formation of dead spaces in which the fines would hang, as explained in the previous article.

This classifier has been made in both conical and pyramidal forms, but the writer prefers the pyramid on account of the better way of admitting the feed it provides. The construction is shown in Fig. 46. The feed is admitted on both sides so that there will be no danger of a strong up-current on one side, as would be the case if the coarse solids were not equally divided. The rising current in the central chamber carries the clay and fines to a hood connected with a pipe that goes to the overflow flume.

The writer does not know why this form has never come into more general use, but believes that it is because the device takes more headroom and a little more space than the form with the ordinary current. I have seen one machine in commercial use, which was working exceptionally well. My own experience has been confined to a small model, but this was satisfactory in every way.

Reversed-Current Classifier

A form of reversed-current classifier that has been used to some extent in classifying fine iron ore is the Wetherbee concentrator, which is shown in section in Fig. 47. The feed falls into a revolving tub, which is in a

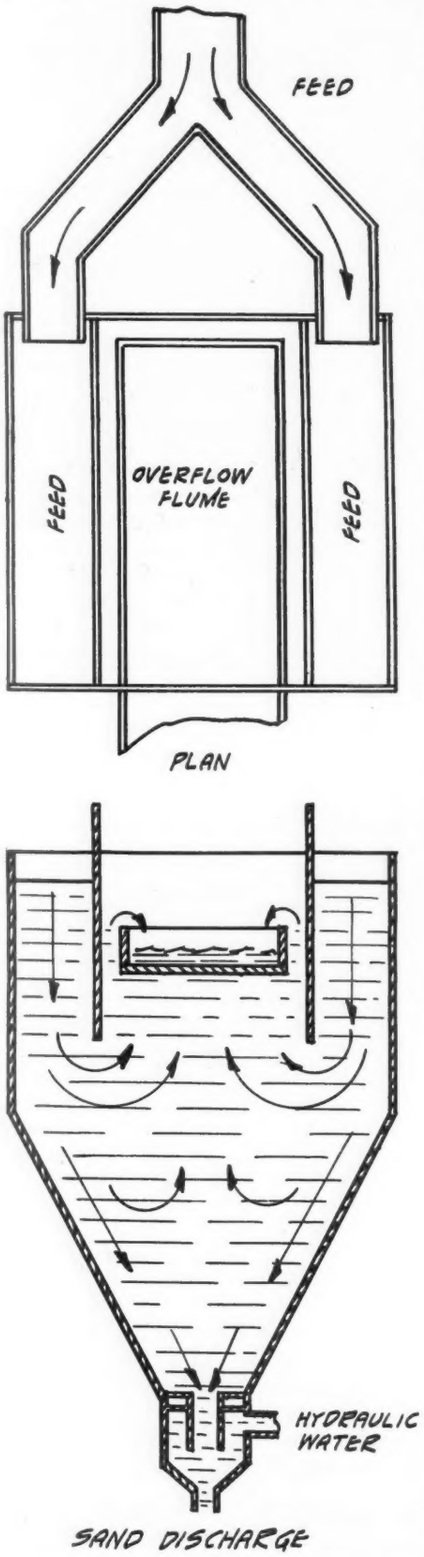


Fig. 46. A reversed current classifier

cylinder placed so that an annular space is left between it and the tub. The feed flows into this space through holes in the side near the bottom. Here it meets the hydraulic water, which is fed into a chamber below the tub. The heavy particles sink through the hydraulic water and are removed through a spigot. The capacity is stated by Taggert to be easily 50 tons per hour of material passing a ½-in. screen. The revolving tub sets up a swirl in the annular space, which keeps the sides clean and assists classification by holding the fines in suspension. It is possible that this machine might find a use in the rock products field for washing such material as the screenings from crushing plants and concrete sand in gravel plants.

Fillers of one shape or another put into the part of the cone or pyramid where dead spaces form have been tried, but without much success. It is possible that a study of the design of the body of a classifier might evolve a shape which would be enough in itself to prevent the formation of these dead spaces.

A really practical way is to use pipes with small holes to put a little water into the dead spaces. The writer has found this method quite successful as applied to automatic settling tanks and has seen others try it successfully too. An illustration in Part IV, April 28, 1928, (on the design of surface current classifiers) shows such a pipe in an automatic settler.

Application to Large Tonnages

One of the earlier applications of classification to large tonnages was at the Homestake Mine, Lead, S. D., where about 4000 tons were handled daily in a battery of classifiers. The device (Fig. 48) is really

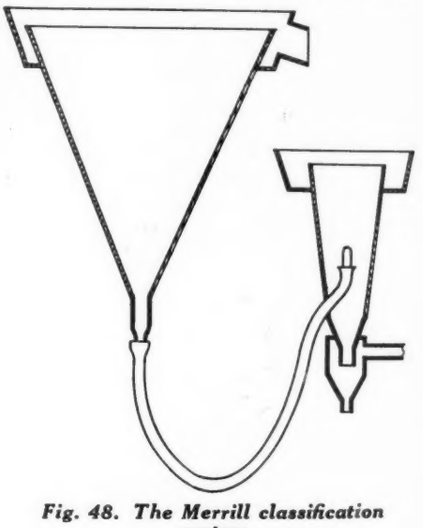


Fig. 48. The Merrill classification system

a double classifier as the first cone, run without hydraulic water, does no more than to dewater the pulp and take off a great part of the fines. The spigot discharge of this cone goes to a smaller cone where hydraulic water is applied. The peculiarity in this classifier is the method of feeding the second cone from the first through a hose that goes into the *interior* of the second cone near the base. The positive upward current created in this way helps to carry off the fines.

The reason why this device is adapted to handling larger tonnages than the older forms is because the large cone gets rid of the greater part of the fines. In one case 88% of the solids were taken off in the large cone overflow. This left only 12%, a comparatively small tonnage to be dealt with by the rising current of hydraulic water. The overflow of the second cone might be added to the overflow from the first or made into a "middling" product, which would be returned to the feed and thus be reclassified.

The problem of handling large tonnages was solved in some instances by building very large cones. The largest the writer has seen were in a coal washery near Birmingham, Ala., and his recollection is that they were 40 ft. in diameter. These were simple cones with no automatic mechanism governing the discharge. They recovered a great deal of fine coal that would otherwise been run to waste, but the writer has heard that they have since been superseded by machines that did not require so much elevation and were more efficient.

Cones up to 18 ft. in diameter were introduced by the writer in the Tennessee phosphate fields to recover the fine sands which had been previously sent to waste.

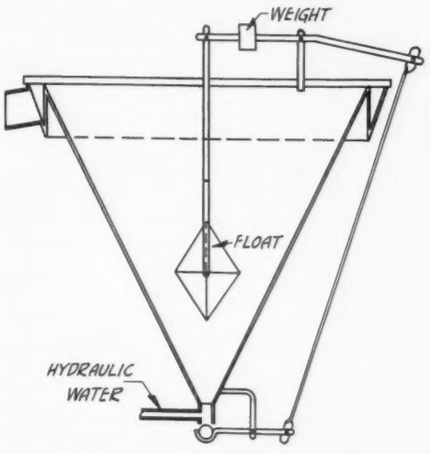


Fig. 49. Diagram of fine sand cone with discharge regulated by the specific gravity of the suspension

They were fitted with a device for regulating the discharge designed by Charles Allen of the Allen Cone Co.

This device (Fig. 49) is an unusual application of the principle that a liquid with solids in suspension has many of the properties of a liquid of the same specific gravity as that of the combination. A float will rise proportionally higher if finely divided solids are added to a liquid so long as the solids are in suspension. Fig. 49 shows the device in a diagramatic form, which will serve to illustrate the operation. In the lower part of the body of the classifier a float hangs which is normally a little heavier than the same volume of water. But its *effective* weight may be made more or less by changing the position of a weight on the lever arm to which the float is hung. As the settling solids accumulate in the part of the cone where the float hangs the float rises and opens a valve at the bottom of the cone allowing the settled solids to escape in a thick pulp. If they run out faster than they are fed in, the specific gravity of the suspension around the float will decrease and the float will sink a little and close the valve.

This is the action of the machine for thickening clayey material. It was found that it made a good device for recovering and washing fine sand, if a spigot supplied with hydraulic water was added; and its use that way in the phosphate field cut down the losses in fine sand very materially.

Classifiers Neither Pyramids Nor Cones

It must be admitted that these large cones had some disadvantages, the chief of which is their height, which has to be approximately

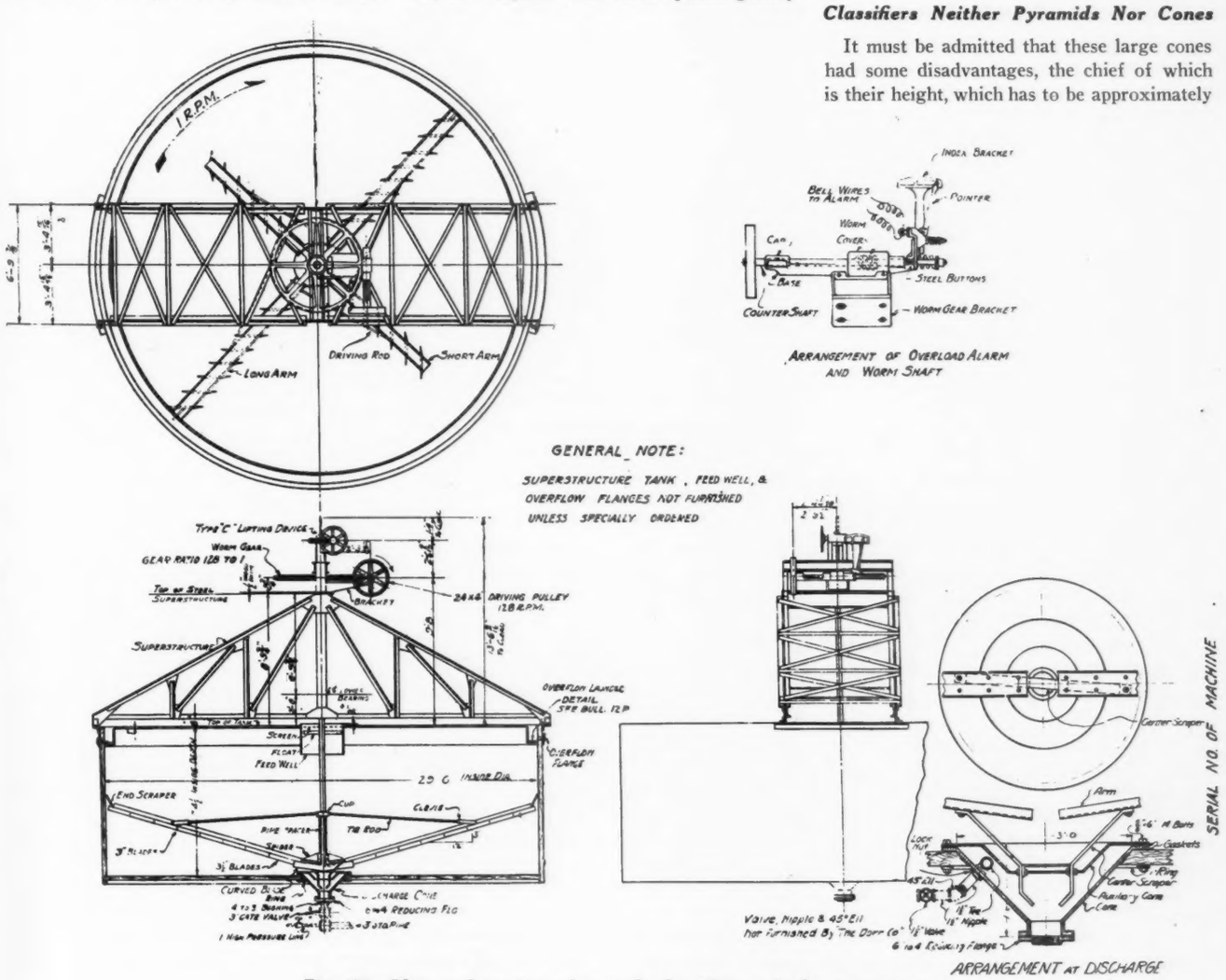


Fig. 50. Plan and section of a tank classifier or hydro-separator

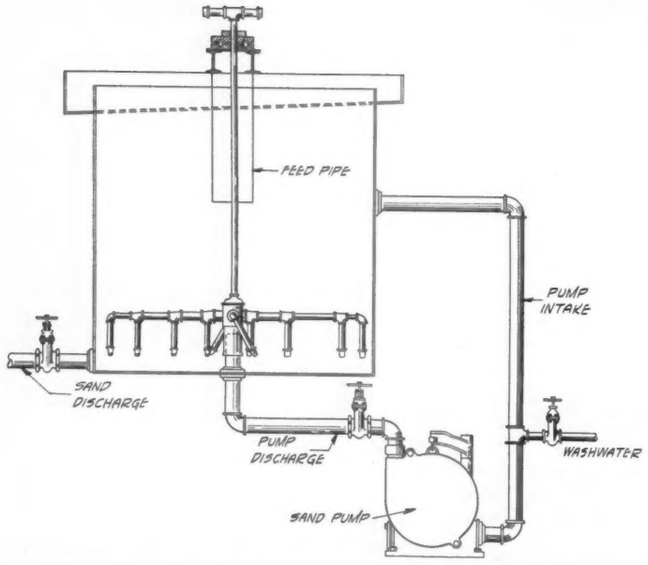


Fig. 51. The Hydrorotator for sand classifying

the same as the diameter. This means an elevator of some kind to handle the feed and sometimes a second elevator to handle the spigot product. There are also some minor disadvantages such as the special form of support that has to be built. For these reasons efforts were made to do the classifying in a flat tank. J. V. N. Dorr, who invented the Dorr classifier, put a mechanism in a flat tank which would collect the settled solids and draw them to a central discharge orifice. It consisted of a set of sweeps attached to a revolving central shaft, the sweeps moving over the bottom as the shaft revolved. Inclined rakes attached to the sweeps worked the settled solids toward the central discharge hole. The machine is the well known Dorr thickener which is used in a great many industries for handling clayey and other finely divided material.

With slight modification the machine is used for classifying sand, especially fine sand. The tank is made smaller and the sweeps are made to run faster. Hydraulic water may or may not be applied to the discharge. In this form it is called the Dorr hydro-separator and it has had a wide use in ore treating and coal washing. In the rock products field it has been used for washing fine phosphate sand. A diagramatic section is shown in Fig. 50.

A machine which departs even further from the older types is shown in Fig. 51. It is called the hydrorotator and it is made by the Hydrorotator Co., of New York City. So far it has had a limited use in the rock products industry, but the writer knows that it is being used in one plant for the washing of fine silica sand. Its special field would seem to be the classification of fine material.

As this machine differs so much from the forms of settlers and classifiers that have already been explained, the description will be given in greater detail. The feed is admitted through a hood which surrounds the central shaft, as shown in the drawing. The coarser particles settle to the bottom of the tank and the fines which cannot fall against the rising current go out with the overflow.

The coarser particles are held in the bottom part of the tank in a thick suspension which is agitated by the "inverted lawn sprinkler" shown in the drawing. This is connected to the discharge of a centrifugal pump and the pump sunction goes into the tank near the top. Once a particle sufficiently coarse to fall against the rising current gets down to the bottom of the tank, it has to stay there, as it cannot rise in the zone above the agitator. In this way a thick pulp of the coarser particles is built up in the bottom of the tank, and when it is as thick as desired the valve marked "sand discharge" is opened to allow it to run out. If the valve is regulated to correspond with the feed admitted, the discharge will be continous and the product will be uniform.

Nozzles Set at Angle

Owing to the angle at which the nozzles are set, the agitator, the inverted lawn sprinkler, moves for the same reason that the ordinary lawn sprinkler moves, the reactionary effect of the issuing stream. The water from the nozzles rises and creates a rising current as high as the pump suction. Above this is a zone of quiet in which the rising current is much less, and this is regulated to carry off only those particles which it is desired to discharge. The other particles are circulated, but a certain portion of them are discharged continually so that they do not accumulate indefinitely. The circulation of these particles is one of the points of the machine noted by its makers; they claim that the fines which accompany the coarse to the bottom of the tank are freed in this way and sent up to go out with the overflow as they should.

A study of this machine made at the University of Utah is given in a paper by A. M. Gaudin and W. L. Remick in *Mining and Metallurgy*, February, 1927. From the examples of which the screen analyses are given, it would seem that the machine can do excellent work in classifying the very fine sizes, such work as might be required in the fine grinding of limestone and similar materials. But the highest efficiency was obtained on schist ground so that 4.8% stayed on 35-mesh and 78.5% on 200-mesh. The rate of feed for this material was high, 550 lb. per sq. ft. per hour.

The devices shown in this number belong to the *free* settling type. The grains fall according to their free settling falling rate as modified by the specific gravity of the pulp, as explained in earlier numbers. In the next number the classifiers described have the grains so crowded in the sorting column that they collide with one another in their fall. These are the *hindered* settling classifiers, and they have advantages which have caused them to be preferred to free settling classifiers for many uses.

(To be continued.)

Gypsum Institute Succeeds Gypsum Industries, Inc.

As noted in Rock Products, August 18, a number of gypsum products manufacturers have resurrected what was left of the gypsum industries national association, which formerly had offices in Chicago, under the name of the Gypsum Industries, Inc., in New York City. In connection with the reorganization the following official statement has been issued:

"For a number of months the gypsum industry has been in an unsatisfactory condition. Although building construction has kept up well in comparison with 1927, the prices of gypsum products have steadily declined in 1928 so that today gypsum products are being offered at or below cost.

"Recognizing the need of co-operation, certain gypsum manufacturers met at the Hotel Commodore in New York City on August 2 and 3 and organized the Gypsum Institute. This organization will take over the properties of the Gypsum Industries, Inc., which suspended activities on May 1, and will function in much the same manner and with some of the same personnel as the old association. Already a headquarters office and a traffic department have been opened at 110 West 40th street, New York City.

"Meetings will be held each month, and it is hoped that within a relatively short time definite progress will be made toward improving the present deplorable conditions that now confront the manufacturers of gypsum products.

"The following officers of the Gypsum Institute were elected at the August meeting:

President, James Leenhouts, vice-president and general manager of the Grand Rapids Plaster Co., Grand Rapids, Mich.

First Vice-President, Eugene Holland, president of the Universal Gypsum and Lime Co., Chicago, Ill.

Second Vice-President, L. I. Neale, sales manager of the Atlantic Gypsum Products Co., New York, N. Y.

Secretary and Treasurer, W. J. Fitzgerald, New York, N. Y.

"Other members of the board of directors, F. G. Ebsary, president of the Ebsary Gypsum Co., Scottville, N. Y., and J. F. Haggerty, president of the National Gypsum Co., Buffalo, N. Y."

What Safety Means to a Quarry Executive*

An Example of the Gradual But Steady Growth of Mutual Confidence and Goodwill Between Employers and Employes

By John Rice
President, General Crushed Stone Co., Easton, Penn.

I HAVE BEEN INVITED to speak to you on the subject of "What Safety Means to a Quarry Executive." I am going to talk to you very informally without burdening you with a lot of statistics, first because they are uninteresting, and second because the General Crushed Stone Co., with which I am connected, has not been practicing scientific safety methods long enough to make comparison with past performance illuminating.

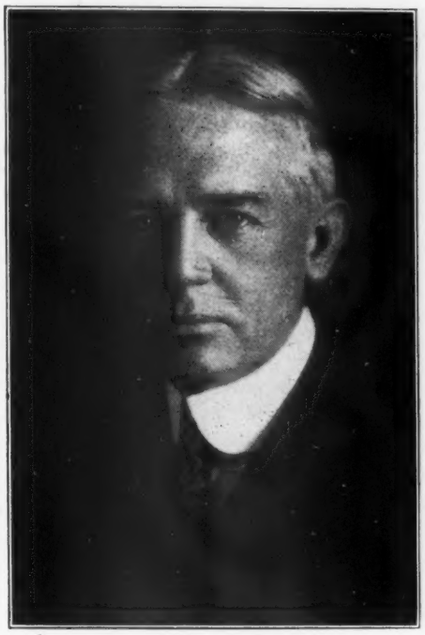
Perhaps my personal experience outlining the gradual evolution of thought about safety is quite typical of the growth of the movement among executives and students of human engineering generally, and this is my excuse for using it as the basis of this address.

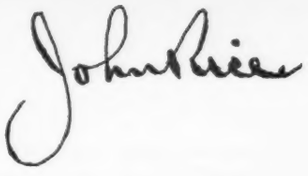
There was a marked contrast in the relationship of the employer and employee during the past, let us say 70 years, with the antecedent time. In the early days before the time of large corporations employers were individuals or partners directing a comparatively few men. Prior to the Civil War much of the work was done by slaves and bond servants. The more intimate contacts and simpler character of the service performed, together with the fewer number of individuals involved, in the first instance, and the self-interest inherent in slaves and bond servants, in the second instance, did result in some personal interest in the welfare of labor.

However, with the growth of corporations, with no personal contacts between executives and large aggregations of labor, with the introduction of machinery, with the opportunity to replace the waste due to accidents, sickness and death from immigration and from a prolific native stock, with the fierce struggle of pioneering business enterprises for financial success regardless of ways and means, little heed was given to the welfare of employes from a humanitarian standpoint; and no conception of the waste from an economic one.

Experience of 40 Years in an Executive Capacity

My personal executive experience covers a period somewhat over 40 years. The first 10 years was for the most part devoted to general contracting, and I was in quite close contact with my men. I was not by nature hard hearted and had an emotional sensitiveness to human suffering, but I cannot recall that I had any great concern about my men's welfare or safety and certainly no well defined policy or principle concerning





it. Employers' liability insurance covered the risk and that was all there was to it.

During this period, however, I became aware of the instinctive willingness of men to risk life and limb, when by reason of some accident or other untoward circumstances, structures, machinery or property of any kind were in jeopardy, by rushing to its rescue regardless of the danger. It was also quite obvious that men often took unnecessary, perhaps reckless, risks in the regular course of their work to expedite its accomplishment, which otherwise would frequently have added to the cost. What I am emphasizing here is not my approval or admiration of such conduct, but the evidence of men's willing co-operation notwithstanding the danger and possible resulting physical penalties.

Under the then existing law, drawn largely in the interest of the employer, the defense of contributory negligence and the act of a fellow workman were usually adequate to deprive a workman of any redress for accidents sustained by him.

In view of my observations just presented this seemed a rank injustice, and led me and my associates to abandon the carrying of liability insurance, when in connection with a contract for ballasting the Lehigh Valley railroad we entered into the crushed stone business about 30 years ago. We set up a reserve approximately equal to the insurance premiums and paid the men from this reserve their expenses and lost time resulting from accidents on the theory that a business ought to be charged with this expense and not the men themselves. Parenthetically, this was of course the grounds for the passage of the later workmen's compensation acts by various state legislatures.

Whether as the result of this policy of intended justice and fairness or not, it is interesting to note that we have never had but one lawsuit with any of our employes as the result of an accident and that one we won.

Profit-Sharing and Group Insurance

As a further evidence of added and growing interest in our men, some ten years ago we inaugurated a profit-sharing system through which our men ratably benefit in our success.

Moved by a continued regard for the well being of our men, a few years ago we effected a plan of group insurance carrying from $500 to $1500 per capita, according to a wage classification, and paid for by the company, further increased by a plan which is partly paid for by the men themselves. This group insurance now amounts to nearly $1,000,000.

The purpose of reciting these acts of modest generosity, or enlightened selfishness,

*Address to the Quarry Section of the National Safety Congress, New York City, October 2, 1928.

as they may appear, is not to exploit our virtues but to point out that notwithstanding a fairly well advanced theory of the relationship of employer to employee during all these thirty years, not until within the last three or four, did we even give any study or analysis to a definite policy of systematic safety either from a humane or economic standpoint. We really gave little thought as to how and why accidents might and should be avoided. It was the persistent efforts of those interested in the National Safety Council that awakened our vision to the fact that we were overlooking a matter of great importance, which was doubtless quickened by our recent adoption of the plan of self-insurance instead of through the various insurance companies otherwise now required by law.

Working Out an Accident-Prevention Plan

We began a thorough study and research in this movement with the result that we formed a definite organization with the responsibility of carrying these theories into practice.

This plan consists of a general committee made up of the executives and assistants in the main office, together with a new officer entitled Supervisor of Insurance and Safety. At each plant is established a committee with the superintendent as chairman. These plant committees meet frequently to confer with the main office committee and also locally to discuss practices and plans. At some plants they meet in the evening to avoid distraction by their current duties, being allowed their regular hourly rate of pay as though at their regular jobs. This has the effect of making the men take the purpose seriously and thougtfully.

Of course, one of the greatest difficulties is impressing the men with the seriousness and importance of safety work. Their first reaction is that they can take care of themselves, and they resent the suggestion of a nurse's solicitude for their welfare. Upstanding two-fisted men like to take a chance, they like the dramatic, the sensational, and as I have already observed there is an instinctive impulse to do the helpful thing regardless of danger to themselves.

However, to appeal to them that the idea is not born of a maudlin sentimentalism, but on the one hand to avoid suffering and loss to them and their families, and on the other hand the loss to the company through the displacement of a skilled or trained employee, the direct expense of the accident through compensation and the indirect loss due to stoppage of work and demoralization of other employees.

Use of Safety and News Bulletins

Our method of arousing and holding the interest of the men is posting on a conspicuous bulletin board the striking posters of the National Safety Council. In order to further attract the men to these posters we have subscribed to a news service which gives the latest information as to events most likely to interest men of our class, similarly posted on the bulletin board. By their inspection of the lessons borne home to them by these posters, they are influenced by the injunction of the Pennsylvania supreme court to "Stop—Look—Listen."

It is but a step to further impress upon the employes the necessity and desirability of prevention of accident to machinery and property as well as to life and limb.

The constant dwelling by the committees on all phases of these questions develops in them secondary ideas such as neatness, order and forethought. It results in a place for everything and everything in its place. As leaders learn, others follow. The best way to learn is to teach.

Neatness reduces fire hazards by the practice of gathering up inflammable material and having a safe place to dispose of it. Cleanliness of machinery often discloses latent weaknesses which otherwise are only ascertained by a breakdown.

A Better Morale Throughout the Organization

A questionnaire to our superintendents as to the effect of the movement discloses, in their judgment a distinct improvement in the morale of their men, a greater interest in their work and many resulting economies.

As one of them expressed it, they have all come to realize that a trained man on the pay roll was a lot more valuable than on a compensation list.

There is a growing and increasing belief by the men that the company is really interested in their welfare, not sentimentally or piously, but sensibly and wisely.

It is interesting to note that in the safety competition inaugurated by the *Explosive Engineer* under the auspices of the United States Bureau of Mines for such quarries in the membership of the National Crushed Stone Association as entered the contest, our White Haven plant won the trophy for 1927, not having had a lost time accident for eighteen months. Our Winchester plant during July had only forty-five minutes lost time as the result of accidents of any nature whatever, men or machinery, which is an admirable record, in our experience.

I can not reduce to dollars the resultant benefits of this intensive safety movement on our part, but I believe it is no exaggeration to say it has effected a saving of 10% in our operating expenses and 30% in our accident expense.

The movement is humane, economical and profoundly wise from any point of view and speaks well for the vision, labor and persistence of those pioneers of the National Safety Council in so earnestly keeping at it until it has become impressed upon most executives as a necessity to industrial progress.

Lehigh Valley Cement Men Celebrate "No Lost Time Accidents"

AT A MEETING of prominent cement manufacturers and their employes held September 21 in the Broad Street theatre at Nazareth, Penn., was undoubtedly the largest gathering of its kind ever assembled in this district. The success of the recently closed safety campaign was celebrated and trophies awarded to the successful plants.

While the original goal of "No Lost Time Accidents" was not entirely reached by all of the plants which entered the campaign, the number of such accidents was reduced from 20 during 1927 to three during the past year.

Due to the lack of seating capacity, attendance, which was by card, was limited to representatives of those plants which were entered.

Morris Fortuin, manager of the Pennsylvania-Dixie Cement Corp. presided and the Nazareth Cement Co. orchestra furnished music. Howard Leh, superintendent of the Lone Star Cement Co., made the presentation of the awards and the principal address was delivered by G. S. Brown, president of the Portland Cement Association and president of the Alpha Portland Cement Co.

Other speakers were Morris Kind, president and manager of the Hercules Cement Corp.; George Coffin, secretary and treasurer of the Nazareth Cement Co.; D. S. MacBride, vice-president of the Lone Star Cement Corp., and Blaine S. Smith, president of the Pennsylvania-Dixie Cement Corp. Announcement was made by the awards committee and the acceptance of the trophies was made by the chairman of the individual plant safety committees.

The program concluded with the presentation of a feature picture, "The Lone Eagle," of special interest to everyone connected with the industry.—*Bethlehem* (Penn.) *Times.*

New California Plant of U. S. Gypsum Co. in Operation

THE UNITED STATES GYPSUM CO. put into operation in September its new production plant at Midland, Calif. This mill is located on the desert in Riverside county, a few miles south of Blythe on a spur of the Santa Fe railroad.

The rock is secured from property close to the mill and there is very little transportation required. A narrow-gage railroad carries the rock to the crushers this short distance. The company is now turning out of this plant large quantities of its regular line of plaster products as well as rock gypsum for cement mills.

The buildings are of concrete and steel and are of good appearance and fireproof and substantial. The town of Midland is essentially made up of the people dependent on this plant for their employment.

Practical Accident Prevention*

By J. R. Davis
Assistant to Vice-President in Charge of Operations, United States Gypsum Co.

LAST year at the A B C session of the Safety Congress, which many of you doubtless attended, Mr. Colville, manager of the insurance department of our company, read a letter written by Mr. Knode, our vice-president, announcing a new plan of accident prevention. The plan was, in substance, that the United States Gypsum Co. would cut the red tape of accident prevention; that we would stop *asking* our men to work safely, and *demand* that they work safely, or in other words, that we would become "hard boiled" in the matter of safety.

The reaction to this letter, by those attending the A B C session, was varied. One or two of those present reacted favorably, but the majority felt that the plan was too drastic, too "hard boiled," to achieve the results desired. The plan, however, was put into effect; and today I want to discuss the reasoning that led to its adoption, in the hope that our experience may be of benefit to others, who find themselves in a similar situation.

A year and a half ago the United States Gypsum Co. was practicing all the conventional ideas of accident prevention. We had safety committees, gave safety prizes, gave safety dinners, conducted no-accident campaigns, held safety rallies, etc. Despite these efforts we were confronted with accident costs higher than we felt necessary and an alarming list of fatalities. Mr. Knode, our vice-president, was the only one among us who saw clearly the cause and the remedy, and it was his clarity of vision that developed the plan announced at the A B C meeting last autumn.

This plan has produced results; and I expect as I have said, to show you that sound reasoning led to its adoption, and that, in our case at least, the decision to adopt it was the right one.

Accident Prevention Like Life

Accident prevention, looked at in one way, is like life itself. Some succeed in life; others do not. Some succeed in preventing accidents; others do not. The sound preparation for success in life is education, acquired either in institutions of higher learning or in the school of experience and similarly the basis of accident prevention is education. Education by itself does not bring success. But education, plus application, plus the desire for success, inevitably brings success. The same chain, education, effort and desire, prevents accidents. In other words, education as to the causes of accidents and the manner in which accidents can be avoided, plus the application of that education, plus the desire to prevent accidents, brings success in accident prevention.

It appears to us of the United States Gypsum Co. that the greater part of the safety work we have done in the past has been educational. Now we are applying the education. And we make the utilization of the education compulsory. No longer do we tell employes that they *should* wear goggles, or that they *should* shut down machinery that is to be oiled, because education and experience have taught them that these things *should* be done. We tell employes that they *must* wear goggles, and that they *must* shut down machinery that is to be oiled; that if they fail to do these things, their jobs will be in jeopardy.

And to some of you here today that attitude may seem an about-face from me, for a year ago I told you that safety primarily is a sales problem, that the idea of safety must be *sold* to employes. I still believe that the idea of safety must be sold or, in other words, I believe that employes must be educated to the importance of safety. Our experience, however, indicated that education, when treated as a sales problem, reached 90 to 95% of the men and was voluntarily accepted by them, but it was the other 5 or 10% who simply would not accept it, that was ruining our accident record and raising our costs. For this reason we changed our policy to one of compulsion and demand that they apply their knowledge of safety or suffer the consequences.

Application of a Common Principle

The statements I have made may sound radical. Actually they are not. All of you gentlemen apply the principle described in your everyday affairs. Experience has taught you, for example, that a crusher must be started before rock is fed into it. Suppose one of the your workmen dumped rock into a crusher and then tried to start it. The result would be one or two hours loss of operating time, due to the necessity of cleaning out the plug-up. What would you do to such a man? You would reprimand him or fire him on the spot.

Suppose again that you had planned a shot in your quarry, and had left instructions as to how the shot should be loaded. Suppose the shot to be a failure that delayed operations and piled up expense. In investigating the cause of the poor shot you find that it had been loaded contrary to your instructions, because some person thought it didn't make much difference how the charge was placed. What would happen to that person? He'd be severely reprimanded or fired; and neither reprimand nor discharge would strike you as particularly radical.

But if some workman violates a safety rule, and is laid off, or fired, in consequence, the action is considered radical, or "hard boiled." Why should it be? It is no more than the application of the same discipline to the matter of safety as is applied to costs, quality and numbers of other things connected with manufacturing. You discharge a workman who wastes your money or time. Certainly a careless working wastes both. And certainly a workman discharged for violating a safety rule is an example to other workmen.

The Example of the Wilful Small Boy

Now let's see if comparable discipline is applied in your own home—and applied to a problem of domestic safety. The example I am to cite will not be within the personal experience of all of you gentlemen, but it will be near enough to personal experience to bring home my point.

Let's say each of you lives near a river; and let's say that each of you has a small son. The river you regard as dangerous. The son you regard as precious. On a certain night the young man comes home with wet hair. You ask him how he got his hair wet. He tries to evade a direct answer, but you finally drag out of him the confession that he has been swimming in the river. Immediately you are alarmed for his safety. By reason and persuasion you attempt to convince him that the river is dangerous, and that he should not go swimming in it again. A week passes, and again you discover your son with wet hair, and again he confesses, reluctantly, that he has been swimming in the river. You repeat your arguments; he promises to respect your wishes. Another week passes, and once

A New Method to Prevent Accidents

NO ADDRESS at the recent safety congress in New York created more interest, discussion and comment than this. Discipline for careless employes is the theme. Treat them like you do the small boy who persistently goes swimming at the risk of his life against parental reasoning and instructions!—The Editor.

*Delivered before Quarry Section, National Safety Council, New York City, October 2, 1928.

more you find the boy with wet hair, and once more you extract the confession that he has been swimming in the river. What do you do? Do you again reason with the boy? Hardly. Convinced that reason and persuasion are of no service, you take the boy to the woodshed and there you discipline him—with a strap.

Are you acting differently then, than we act when we discharge a man who violates a rule of safety? Are you dispensing a different brand of justice?

After all, accident prevention simply is good business, as discipline is good business. And the plant wherein discipline is maintained not only will be a safe plant, so far as accidents are concerned, but in virtually every instance will be a plant wherein manufacturing costs are low, quality is high and "housekeeping" is efficient.

What Are Accident Costs?

Webster defines mining as "the art of extracting ore from the ground at a profit." Quarrying is open-pit mining. If we are good miners, market conditions being favorable, we make a profit, largely by keeping our costs down. Accidents are an item of cost; and if we attempt to operate without an accurate knowledge of the cost of accidents we fail, in part, at our jobs.

But what are accident costs? Are they solely the money paid in premiums for compensation insurance? We don't think so. In our case we compute costs of accidents, not only by the premiums we pay, but by money spent on hospital bills, doctor bills and compensation actually paid to the injured man or his family; or in other words, the actual cost of the accident. These figures we compare with our past costs in the same manner that we compare operating expenses and profits with the past. And it was this comparison of accident costs, on the basis just described, that led us to abandon the more sentimental policy of accident prevention by wheedling and persuasion, and to substitute for it the clean-cut policy of individual responsibility of each workman to observe the safety rules that we make.

And I might point out, that if you find compensation rates high, the best way to force them lower is to reduce the number of accidents in your plants.

Results of the Plan Are Proof of Workability

As I have already said, the plan of making the individual workman responsible for his own safety has been in operation for approximately a year. You want to know the results, of course. Before I give them to you, however, I am going to read to you a letter, written by one of our works managers who was quick to grasp the significance of the plan. This man has had much experience in mill operation and his point of view is more practical than literary. So disregard the literary style and heed the meat of his remarks. Here is what he said:

Grand Rapids, Mich.

Mr. O. M. Knode, Vice-President:

I have your letter setting forth our safety record for the year to date. This report is disheartening, and after all you have done to promote safety, the facts must be a keen disappointment to you.

I have read the letter many times, and in the following letter I have tried to analyze it from two viewpoints. Though I may not have succeeded in my analysis, I have, at least, set forth my true thoughts and expressed my attitude.

Under the present plan we try to promote safety by appealing to our workmen, the strongest note in this appeal being that we are seeking safety for them. We invite them to serve on our safety committees, ask their advise as to how we can better conditions, try by means of bulletins, movies, literature and "silver-tongued" orators to show them the errors of their ways and the heart breaks, wants and suffering that is caused by accidents.

We make personal appeals to our workmen, begging them for the sake of their loved ones to work carefully and not get hurt, and as a net result of the time and money spent we have a mounting accident cost, and workmen whom we have not only failed to convince that safety paid dividends, but that we were even sincere in our purpose.

Now it is very evident that we have failed. Why? I can only give my opinion, and that is, that there has been too much division of authority, or rather, no authority, and too many uninterested men on our safety committees.

The plant managers put safety work up to safety supervisors, who pass it on to the different committees and foremen. The safety supervisors have their routine inspections and meetings, and consider the work done when they have turned in the regular number of suggestions concerning guards and defective equipment, should they be able to know what defective equipment was.

These reports are all nicely typewritten, and presented to the works managers. And as there is a lot of them, and as he has a number of trusted employes on the committees, he assumes that his plant is as safe as a nursery, and that all his employes are true disciples of safety. Then there is an accident, but no one is to blame. The required number of men have been on the committees. The inspections have all been made on the day and date set. Meetings have all been called to order at the specified time. The minutes and records are all complete. The safety supervisors have done their duty in a routine manner, and have complied with all rules as set forth in the safety bulletin governing the plant safety organization. This done, why should they be to blame for an accident? They all are sorry, of course, and express their sympathy in different ways. By sending flowers, or, if necessary, by taking up a collection. This done, their interest, which was first aroused at the time of the accident, stops, and the accident is something that just happened, and happened because we had a safety man in the office reading up on improved safety methods written by a man also sitting in an office; because we had a committee of foremen who served on the committee only because they had to and whose minds were more concerned regarding the quality of a certain product, or the production of a certain machine than they were concerning the inspection they were making, and whose idea of safety was to run in as many suggestions as possible regardless of their value; because we had a committee of workmen, who, believing that we were not sincere in our efforts, were not sincere themselves, but as they had to do something, turned in a lot of recommendations, the chief value of which was to take up the stenographer's time in writing them. This being the cause, the remedy would be:

First, a safety supervisor who knew what he was required to do, and had the authority to do it. In a small plant this would be the superintendent, and in a large plant the assistant works manager, for it is just as essential to have someone with authority in charge of safety as it is to have someone with authority in charge of quality or production. In fact, the three are so closely related that they should come under one head.

This supervisor, whoever he would be, would have as his only assistant a man who would keep records necessary to carry on the work. These records should be a true statement of conditions, and not records that lead to the belief that we were making progress when we were not; and should include records of the men who, as far as the workmen are concerned, are the company: the department heads, foremen and the key men on whom the success of the safety movement depends. These men were chosen as foremen, etc., because they were above the average and able to lead, and do lead in everything but safety. In safety, however, we have a division of authority, and, as stated before, a safety supervisor with ideals that do not fit conditions, a foremen's committee, which knowing that they are not held responsible, have no interest other than to get their inspections done and to get back to the job for which they are held responsible, and a workmen's committee, the main function of which is to clutter up the joint meeting with numerous and worthless suggestions, but which must be taken up and disposed of in a manner which will not offend them. It is true that it is a part of this committee's duties to interest their fellow workmen in the safety-first idea, and to caution them whenever they resort to unsafe or unsanitary practices. But it is not done. And as I see it, it cannot be done. When men are not sincere they cannot be convincing.

Second, as they have no authority they can only suggest.

Third, as the workman lifting on one end of a board considers himself just as good as the man on the other

end, and will resent anything he may say regarding his habits or practices, many workmen resent safety warnings.

Fourth, the average workman, whether he be a high priced mechanic or a common laborer, has no use for tale bearers, and though he may know of unsafe practices will not report them. The only way such practices can be found out is through the foreman, and as he would be responsible for the safe operation of his department, he would have authority to see that unsafe practices or habits be stopped, or he could dismiss the workmen, and when he did it would be his duty to talk to the man and impress on him that he was being dismissed because he had persisted in doing what the company considered as detrimental to its interests.

I would, in this way, show our workmen that safety paid, not only by eliminating pain, want and suffering caused by accidents, but also pain, want and suffering caused by the careless workmen having no place in industry.

Safety is an ideal worthy of our best efforts, and it would be sublime if it could be obtained by ideal methods. But if this is not possible, let us strip it of its glamour and make it just what it should be, a cold business proposition, in which all sentiment is left out.

This will require work by plant managers, work by the department heads and foremen. And the measure of success obtained will be in proportion to their efforts. To me this does not appear as added work, but an opportunity to show you that we can and will, if it is within our power to do it, attain your safety ideal.

(Signed) F. O. Gotch,
Works Manager.

This was the response of a practical operator to Mr. Knode's plan. And the results of his attitude immediately were apparent in his plant. Others, however, did not grasp the vitality of the plan as quickly as he did and were slow to put it into operation. But August, 1928, the busiest month we have ever had, and one in which we employed many new men, was one of the best months, from the viewpoint of safety, that the United States Gypsum Co. has had. And with your permission I will read details of our August safety record.

	August, 1928	Year to date 1928	1927
Fatal	None	5	6
Permanent total	None	1	2
Disability one or more days	16	111	127
Total reportable	65	420	473

In order to better apply the principle of individual responsibility for accidents we now analyze all accidents by causes, dividing them into personal and impersonal classifications. We further break them down so that the real cause of each accident may be known, and the proper remedies to prevent repetition may be applied.

In addition to this we require our foremen to send in a complete report of each accident. This report sets forth the circumstances under which the accident occurred, leads up to a conclusion as to the real cause of the accident and requires a statement as to what action is being taken to prevent a repetition of the accident. The application of our method of analyses to our August accidents gives us the following classifications of causes:

Personal

1. Supervisor 1
   Incomplete instructions.
2. Worker.
   A—Mental deficiency:
   Ignorance 1
   Poor judgment 6
   B—Mental laxity:
   Inattention 40
   Non-co-operation (disobedience of rules) 2
   C—Physical defect:
   Weakness 1
   D—Unsafe practice:
   Clothing (gloves) 1
   Haste 2
   Short cuts 3

The point most to be observed in the analysis just presented is that 40 out of 57 accidents were due to inattention or carelessness. Accidents resulting from these causes are the ones we are constantly striving to overcome, for it is these types of accidents that are most frequent and least necessary. It may occur to you that our August record does not show, in preventing these types of accidents, success comparable to the enthusiasm with which I have presented our new plan of accident prevention to you. In our plants, however, the percentage of accidents resulting from inattention and carelessness is declining sufficiently to convince us that we are on the right track; to convince us that so soon as all factors concerned in the operation of the plan are thoroughly understood the results will far outstrip anything that we have accomplished in accident prevention in the past.

CLASSIFICATION OF ACCIDENTS BY THE UNITED STATES GYPSUM CO.

PERSONAL

1. SUPERVISOR (FOREMAN).
   - A. Faulty instruction.
     1. None.
     2. Incomplete.
     3. Erroneous.
   - B. Operations—Improper.
     1. Layout of machinery.
     2. Layout of operations.
     3. Layout of processes.
   - C. Poor discipline.
     1. Rules not enforced.
     2. Horseplay.
2. WORKMAN.
   - A. Mental deficiency.
     1. Ignorance.
     2. Inexperience.
     3. Poor judgment.
   - B. Mental laxities.
     1. Excitability.
     2. Violent temper.
     3. Sluggishness or fatigue.
     4. Inattention.
     5. Non-cooperation (disobedience of rules).
     6. Worry.
   - C. Physical deficiency.
     1. Defects.
     2. Weakness.
     3. Fatigue.
   - D. Unsafe practice.
     1. Clothing—Improper, loose long sleeves, ties, high heels.
     2. Protection—Improper, no goggles, gloves, masks, shoes, hats, etc.
     3. Short cuts.
     4. Haste.

IMPERSONAL

1. BUILDING CONDITIONS UNSAFE.
   - A. Fire protection.
   - B. Exits and openings.
   - C. Floors.
   - D. Miscellaneous.
2. WORKING CONDITIONS—IMPROPER.
   - A. Light.
   - B. Sanitation.
   - C. Ventilation (dust).
3. HOUSEKEEPING—POOR.
   - A. Improper piling and storage.
   - B. Insufficient room.
4. EQUIPMENT—DEFECTIVE.
   - A. Machines.
   - B. Tools.
   - C. Miscellaneous.
5. HAZARDS—MECHANICAL, ELECTRICAL, CHEMICAL AND STEAM.
   - A. Unguarded.
   - B. Ineffectively guarded.

Summers Fertilizer Co. to Erect Phosphate Plant at Baltimore

THE Summers Fertilizer Co., Inc., Baltimore, Md., has recently signed contracts for the erection of an all-steel, crane-operated superphosphate plant. Ground has already been broken and the plant will be in full operation by November 1 with a capacity of 50,000 tons of superphosphate a year. It will replace similar facilities destroyed by fire in 1926.

The Austin Manufacturing Co., Cleveland, Ohio, will erect the plant. The Kent Mill Co., Brooklyn, N. Y., are supplying two type No. 7 air separators. The Harnischfeger Corp., Milwaukee, Wis., will install an 80-ft. bridge crane. This plant will contain the most modern superphosphate manufacturing equipment. It will adjoin the mixing and shipping unit, which likewise is an all-steel, crane-operated plant, located in the Canton district of Baltimore, on deep water.—*The American Fertilizer.*

What Organized Safety Work Has Done for the Cement Industry*

By E. Posselt
Vice-President, International Cement Corp., New York City

ACCIDENT PREVENTION in the cement industry was started deliberately, not accidently, and today it has grown until it is no incidental part of our activities.

Successful safety work requires the interest and attention of everyone in the organization from the highest official down, and the progress achieved in recent years is certainly powerful evidence of general interest.

Cement company executives who are the guardians of plants and properties have a very definite obligation to conserve and develop human equipment, which after all is the great motivating force. But, this is not only a moral obligation; it is good business —it gives big returns. A good plant, from a purely mechanical point of view, can be built in a comparatively short time. An efficient operating organization, however, requires much longer time to build up, and the most exacting efforts on the part of the executives in training the men. A broken bolt can be replaced without a great deal of difficulties; a broken arm cannot be restored to normal function except by the natural process of healing, which takes a long time. It is true that if a man is injured he may be replaced, but the training required to make a substitute proficient is usually no small item, and the change involves loss of time, hard work and risk; with the result that the substitute, with all of our investment in him, may be no better than the man we had originally.

In many other ways as well, accidents destroy the effectiveness and morale of organizations. If one man is injured, the entire force may fear or take a dislike to certain equipment, or may even lose faith in the organization for which they are working. Frequent accidents often drive men to other work, and not infrequently very good men are lost in this way. Consequently, it is not unusual to find high accident rate coupled with a large turnover, and in such cases it is difficult to decide whether the large turnover is due to the many accidents or the many accidents to the large turnover. Nevertheless, these two undesirable factors are closely linked together. In our own industry we notice that last year 347 out of 1143 accidents were to men employed less than six months, and 486 out of 1143 accidents occurred to men who had been employed less than one year.

To obtain the proper results in accident prevention, organized efforts are necessary, in fact essential. I would like to emphasize this statement by pointing out my own experience and observations in the plants of the International Cement Corp. No efforts or expenses are spared to build our plants in the most substantial manner, arrange and install the equipment with every thought of safety and provide all possible means of accident prevention. We still have a long way

E. Posselt

to go before we consider that every plant is mechanically perfect as far as safety is concerned, but I have no hesitancy in saying that at least several of our plants are as well protected as modern engineering can provide; and yet we have accidents—in fact we have suffered some very severe accidents in our most up-to-date plants. This, gentlemen, would emphasize that the personal equation cannot be controlled by machinery, and without the interest and complete co-operation of every man in the organization accidents cannot be avoided.

How To Use Statistics

Under the direction of our Portland Cement Association committee on accident prevention, the association has furnished us with statistics and information of all kinds pertaining to accidents and their prevention, and has suggested various and sundry methods for the most effective efforts towards accident prevention.

All of this can only be the means towards an end, and each plant organization must after all work out its own salvation, so to speak.

Most of us are inclined to judge the performance on the total and average figures, and without a very careful analysis of all the data pertaining to a problem we may overlook some of the very important facts. This applies to the statistics which we gather on accidents, and if one is content to compare his own performance with the averages and totals of all the other plants, then he may not get as good results as is possible under his particular conditions.

As an example of what individual efforts can produce, I have prepared a table attached giving the accidents and days lost per 100,000 man hours, as tabulated by the Portland Cement Association for 1925, 1926 and 1927, and have shown the corresponding figures for the plants of the International Cement Corp. for this same period.

For the purpose of classifying the performance, it has been customary for the last several years to divide the plants into four groups. The first quarter of the plants reporting and having the lowest accidents come in in the first group, the next quarter are placed in the second group, and so on.

This classification shows in every year a very large difference between the first group and the fourth group. The table shows very forcefully the improvement during these last three years.

For our own plants, records are kept along the same lines as those of the association. We are very strict in the classification of accidents, and under our system and policies there is but little possibility that a lost time accident is not properly recorded.

In 1925, none of our plants were in the first group, and our performance was not as good as the average of all of the 120 plants included in the association reports. In 1926, we had one plant in the first group, four plants in the second, two plants in the third and only our foreign plants remained in the fourth group. It is evident that the foreign plants had a good many more accidents than domestic plants, and for this reason we urged the association not to include the figures of the foreign plants in the statistics, and for

*Extracts from an address at the Cement Section Meeting of the National Safety Congress, New York City, October 2, 1928.

1927 these have been left out of the record.

In 1927, we had three plants in the first group, two in the second and two domestic plants in the third group, and the average of the accidents in all of our plants was considerably below the average of 134 plants reporting to the association.

A complete study of the conditions in our own plants, and organized efforts, intelligently guided and systematically enforced, are the only way in which the proper results can be obtained, and I believe the figures presented speak for themselves as evidence of the effect of organized efforts.

Applying American Methods in Foreign Plants

Four or five years ago we began to implant the American methods of accident prevention in our foreign plants. Many of us operators who are familiar with conditions were skeptical as to results, and very discouraged during the first few years. We were operating in countries where industry was but little developed, and the great mass of labor instead of being interested in preventing accidents were rather inclined to use any little injury as a pretext for laying off. Real efforts date back only to 1925, and it is simply astonishing to note the interest that the men themselves are taking in this work today, and the figures which are given in the table show a very marked improvement, and I can further state that still better results have been had during 1928. Without organized safety work this improvement would not have been possible.

I am impressed with the interest the executives are taking. It reflects their belief that accident prevention is worth while, and their desire to be helpful to the men. Without the encouragement of the executives, accident prevention activities have a hard time of it in any mill. I have also been impressed with the awakening that has come to our superintendents and foremen, and it is a splendid sign to see the foremen voluntarily accepting more responsibility of this kind.

Gains Public's Goodwill

Our work has an additional value, incidental perhaps, but nevertheless important. It is earning for us the respect and confidence of the public. Industrial publications regard reports of our accident prevention progress as important and give this news the prominence which it deserves. Even the daily newspapers publish current reports of our safety work, because they realize that the progress we are making is of public interest. Comments are not limited to the papers of the small cities and towns where the plants are located, but the leading papers of the country are giving splendid publicity to our work.

Popular interest in our accident prevention work is building popular respect for us among the public at large. The public is beginning to realize that the cement industry is taking active steps towards reducing accidents in mills and that it is working in the interest of its employes. It is beginning to realize that our mills are safe places in which to work—probably much safer than our streets and highways.

ASSOCIATION GROUPING OF PLANTS ACCORDING TO ACCIDENTS AND DAYS LOST PER 100,000 MAN HOURS WITH THE LOCATION OF PLANTS OF THE INTERNATIONAL CEMENT CORP.

1925—120 Plants Reporting	Per 100,000 man hours. Average No. accidents	Per 100,000 man hours. Average No. days lost
First group. Best 30 plants No. 1-30	.9	12.1
Second group. Plants No. 31-60	1.5	30.0
Third group. Plants No. 61-90	2.9	51.8
Fourth group. Plants No. 91-120	5.5	110.9
General average all association plants	2.6	49.9

1926—124 Plants Reporting	Per 100,000 man hours. Average No. accidents	Per 100,000 man hours. Average No. days lost
Best 31 plants No. 1-3	.6	10.2
Plants No. 32-62	1.6	25.3
Plants No. 63-93	2.2	49.9
Plants No. 94-124	5.3	113.0
	2.2	45.3

1927—134 Plants Reporting	Per 100,000 man hours. Average No. accidents	Per 100,000 man hours. Average No. days lost
Best 34 plants No. 1-34	.2	3.5
Ten of these plants were awarded the association trophy of which the Kansas Portland Cement Co. was one.		
Plants No. 35-68	.5	11.2
Plants No. 69-102	1.1	36.2
Plants No. 103-134	3.4	104.8
	1.4	34.6

LOCATION OF INTERNATIONAL CEMENT CORP. PLANTS IN ABOVE ASSOCIATION GROUPS

		Association No.	No. of accidents	No. of days lost
First group.	No plant in this group			
Second group.	Kansas	38	3.30	27.1
	Indiana	45	2.38	29.9
Third group.	Cuba	63	2.85	41.8
	Dallas	77	2.31	52.1
Fourth group.	Alabama	91	4.26	65.3
	Houston	105	4.62	99.6
	Argentine	110	8.42	130.2
	Knickerbocker	116	8.13	183.4
	Urugury	119	14.20	217.6
General average of international plants			5.61	9.41

*Louisiana operated last half of 1927.

	Association No.	No. of accidents	No. of days lost
Houston	14	.7	8.0
Kansas	39	1.0	21.2
Alabama	42	.7	21.9
Virginia	58½	2.8	33.3
Indiana	62	3.8	35.8
Dallas	83	.7	54.0
Knickerbocker	86	2.6	58.5
Cuba	104	4.5	81.4
Argentine	115	7.0	115.2
Uruguay	123	14.5	220.8
		3.8	65.0

	Association No.	No. of accidents	No. of days lost
Kansas	3	.0	.0
Houston	21	.2	4.3
Dallas	23	.3	5.7
Virginia	37	.4	9.9
Knickerbocker	55	.5	19.0
Alabama	78	.86	27.4
Indiana	89	.83	38.9
Cuba	79½	2.1	31.1
*Louisiana	100½	6.4	57.9
Argentine	110½	3.9	65.8
Uruguay	132½	15.9	228.0
		2.8	44.4

1927—Cuba, Louisiana, Argentine and Uruguay not being listed in the association report are given numbers intermediate to regular numbers and properly classified from data supplied the New York office.

Cement Plant Safety Plans Cost $500,000

THE SUPERIOR PORTLAND CEMENT, INC., Concrete, Wash., has spent more than half a million dollars in the last three years to make the Superior plant at Concrete as near absolutely safe as possible, with the result of a perfect record for the first eight and one-half months of this year. Not a single lost-time accident has happened in the big plant since January 1, and the 270 men employed in the mills and at the quarry proudly look aloft every day at the waving flag that is the sign of a perfect record. This was revealed recently by C. N. Reitze, vice-president and general manager of the company.

Instead of a limestone cliff 400 ft. high as the base of quarrying operations, the cliff has been cut back with an upper bench on which one big electrically-driven shovel works, while another is busy on the lower face. Thus danger to quarrymen is greatly reduced, Mr. Reitze said.

One item of the half-million expenditure for these safety measures covers an entirely new electrical installation throughout the plant at a cost of $100,000. Part of this is the largest electrical switchboard in any cement plant in the western United States.

"We have carried on an intensive educational campaign, also, among our employes, and we were one of the top three in taking first aid prizes in the industrial division of the all-state contests held in Tacoma last August," said Reitze. "Our team went to San Francisco October 2, for a contest with other Coast cement teams.

"In 1926 workmen at Concrete lost 522 days from accident, and there were two fatalities. Last year the lost days were cut to thirty-nine, with only one fatality, and this year so far not a single lost-time accident."—*Seattle* (Wash.) *Post-Intelligencer.*

Rock Products' Men Prominent at National Safety Congress

Much of Interest and Value to Rock Products Operator Developed at New York Meeting—Cement Man Elected National President

COMING together for sessions in almost every known type of safety work, the Seventeenth Annual Congress of the National Safety Council opened its five days' meeting on October 1 in New York City. This year's congress attained such large proportions that it was necessary to use five different hotels to house the meetings and entertainment features. The quarry session and the cement meetings were held at the McAlpin Hotel on October 2, while the other sessions that held the interest of those in the rock products field, those of the mining section, met at the Waldorf-Astoria Hotel.

Quarry Session

The quarry meeting of the congress was opened by Chairman D. C. Souder of the France Stone Co. on Tuesday morning, October 2, at the McAlpin Hotel. After a brief report by the chairman concerning the year's activities of the section, a paper was presented by John Rice, president of the General Crushed Stone Co., Easton, Penn., on "What Safety Means to the Quarry Executive." This paper created so much favorable comment and contains such worth-while ideas that it is presented in another part of this issue in its entirety.

In the discussion which followed Mr. Rice's paper, the question of men wearing goggles was brought up. H. F. Yotter, insurance supervisor of the General Crushed Stone Co., answered for his company that goggles were urged upon all the men, but that there was not a strict rule requiring that they must be used. He declared that little trouble had been experienced in this line. Mr. Souder stated that the France Stone Co. required the men to wear goggles and that anyone who did not comply with the ruling would be fired, no matter what his length of service with the company. Mr. Chapin, of the United States Bureau of Standards, was asked his opinion concerning goggles, and stated that no one ought to be forced to wear goggles provided they did not fit. Each company should take the responsibility of individually fitting each man, since the varying characteristics of each man's head make it impossible to use one standard type. At this point, Mr. Chapin also pointed out that it is actually the function of the company to determine

Major Henry A. Reninger, of the Lehigh Portand Cement Co., who has been active in safety work for several years, and who has been elected president of the National Safety Congress in recognition of his own work and the work of the portland cement industry in accident prevention

whether a man's eyesight is all right and to see that he is fitted with glasses if necessary. He pointed out that the use of goggles, like the wearing of glasses, was all in getting used to them, and that there was very little inconvenience after the men began wearing them regularly. Mr. Chapin emphasized the fact that officials of the company when passing through the plant should be careful to wear goggles, since the men are quick to note the use or lack of use of goggles. A company could well afford to pay for goggles broken on the job, he said, since each broken pair represented an accident prevented, and unquestionably the goggles were cheaper than the accidents. Concluding, he mentioned a number of things that should be remembered in fitting the men, such as providing colored lenses for some, and supplying goggles with sweat bands for men who perspire freely. He added that in distributing goggles the band should always be left loose so the man will tighten it to suit himself, and he stated that it seemed universally true that with a tight band the men would soon discard the goggles instead of loosening the band. J. R. Davis, of the United States Gypsum Co., stated that it was possible to get 90% of the men to comply with the safety suggestions, but that there was still 10% who would only live up to the rules by the use of "strong-arm" methods, such as the one suggested by Mr. Souder. R. E. Colville, of the same company, said that he believed in regular rules for safety, but that these rules should certainly be reasonable, as it was nearly impossible to enforce unreasonable rules effectually. N. S. Greensfelder, editor of *The Explosives Engineer* of the Hercules Powder Co., in commenting on Mr. Rice's paper pointed out the advantage of organization in safety work, citing the portland cement industry as one field in which organized work for safety had accomplished much. Replying to this, Mr. Colville, speaking for the executive committee of the quarry section, stated that the section was planning during the coming year to co-operate with the National Sand and Gravel Association, the Portland Cement Association, the National Slate Association, and similar organizations in the rock products field to put forward a united front for safety work. W. A. Kelly, plant superintendent for the John T. Dyer Quarry Co., Norristown, Penn., reported on the reduction of accidents through the wearing of goggles from 120 in 1927 to 22 in 1928. The men in the Dyer quarries wear the goggles on windy days, though they are not forced by rules to wear them. Mr. Colville closed the discussion with some facts on group insurance as brought out by the experience of the U. S. Gypsum Co. He said that a lot of the employes will take the insurance voluntarily, and that it is noted that after a little cold weather and a few colds preventing appearance at work, the balance of the force is almost sure to join in. The proposition of safety must be sold to the men so they can see it as they see the advantages of the insurance. The management knows how many eyes have been lost, and how many other accidents have occurred, but the men do not know unless they are told. The records must be given publicity. The statistics are of no use unless they are used.

Practical Accident Prevention

J. R. Davis, assistant to the vice-president of the United States Gypsum Co., presented a paper entitled "The Company Executive in Charge of Operations Talks Accident Prevention," which caused more discussion than any other at the session. Mr. Davis' paper concerned the cutting

away of the red-tape of accident prevention and is published elsewhere in this issue in full. Mr. Chapin said that the system recommended by Mr. Davis was, in a modified form, in practice on the Union Pacific Railroad, where a fine safety record had been established. On this road authority for maintaining this record was entirely vested in the safety superintendent.

Mr. Davis was asked if he considered that the work which other companies were doing with safety committees, campaigns, and similar methods was of little or no value, and he replied that that was far from the idea he had intended to convey. These measures he said were necessary as an education to the men, but did not carry the work far enough, and that the sustained record must be kept up by positive methods. He felt that the U. S. Gypsum Co. had already passed through the stage of preliminary education on safety matters for its employes and now was taking an additional step. Mr. Colville of the U. S. Gypsum Co. told how his company's accident records were kept and how no record was complete unless the man in charge added a remedy for the trouble at the bottom of the blank. The question was brought up as to how best to educate the men to safe methods, and answered by a number present. Mr. Davis suggested personal contact and instruction, safety bulletins, and a comprehensive set of safety rules. Mr. Chapin added that after every accident the injured man and his foreman should appear before the plant safety committee, since the committee is more likely to be more searching in its inquiry than would a plant executive. Mr. Colville said that the way to obtain the desired results was to make each person responsible for his particular share, from the management down through the foremen to the men themselves, and above all to remember that their duty was to prevent accidents, not to investigate after an accident. Otho M. Graves, of the General Crushed Stone Co., and president of the National Crushed Stone Association, said that he was particularly impressed with the attitude of the works manager whose letter was included in Mr. Davis' paper. The letter shows the belief in the inevitableness of compulsory safety and outlines methods of obtaining safe practices. On the other hand, Mr. Graves said he was glad that it was conceded that not all of the present work is unavailing. He felt that if the men would do the things they ought to because they liked to do them, the best spirit would be engendered. Citing the case of his own company, he said that because of the leadership of John Rice, coupled with his reasonableness, the safety work had been carried far, along with the other efforts of the company. The men should be taught to believe in the movement, Mr. Graves said, and should be shown that the attitude of the company is not hypocritical. It is easy to show that the company has two interests in the matter, because the management knows each man well enough to feel sorry when this man or that man is hurt, and at the same time it is nothing to be ashamed of that accident prevention is an aid to the welfare of the company. Meeting the men on this level will bring about the best feeling, and possibly will result in making Mr. Davis' plan unnecessary.

Tonnage with Safety

F. F. McLaughlin, general superintendent for the Rock-Cut Stone Co., Syracuse, N. Y., was unable to be present, but his paper on "Getting Tonnage with Safety" was read and discussed. In part the paper stated:

"Success in human enterprise depends on intelligent human leadership. I believe in the necessary mechanics of safety work such as plans, committees, safeguards, first aid, and all the various ways and means that are guides of action to produce accident prevention, but quarry safety rules and machine guards are effective only when it is the spirit of our men to observe their use. Safety rules will not enforce themselves nor a removed machine guard replace itself. The spirit of observance can be had from most of our men by driving or the better way of leading. Only he is fit to lead who has fit himself for following. Accident prevention is humanitarian progress and requires dynamic sincerity in its leadership. Observation of a number of safety efforts has convinced me that the most perfectly laid plan for safety is but as a house on shifting sands until laid on the foundation of a sincere man's leadership. When the choice lays with themselves, our employes will follow a man who is sincere enough to practice what he teaches. . . . Do you men honestly want safety with your tonnage? Are you willing to pay the personal price to get it? Then think straight, like your men, be the kind of a man you want your men to be, be a leader for your men fit to be followed, and it will follow slowly but surely that most of your men will willingly engage with you in the attempt to attain the highest standard you can set for safety or tonnage, or both."

Closing the discussion on the last paper, Mr. Chapin suggested that discipline should be given to men who almost have an accident, instead of to those who actually do have an accident. He pointed out that the man hurt has already been punished and will not forget it, but the man who received no injury may be just as much at fault and should be censured to prevent him from repeating the offense. At the same time, he said, men should be rewarded for good work in safety, and he recommended that the companies send the man with the best safety record to the annual congress, thus aiding the work in their own companies and of the national council.

Election of Officers of Quarry Section

The last duty of the quarry section before adjournment was the election of officers for the ensuing year. These were named as follows:

R. E. Colville, U. S. Gypsum Co., chairman.

F. F. McLaughlin, Rock-Cut Stone Co., vice-chairman.

J. R. Boyd, National Crushed Stone Association, secretary.

The committee chairmen named were:

Poster Committee, H. F. Yotter, General Crushed Stone Co.

Statistics Committee, W. W. Adams, U. S. Bureau of Mines.

Membership Committee, D. S. Souder, France Stone Co.

Besides the above mentioned officers who are also members of the executive committee, that committee will have on its membership representatives of other associations who will work with the quarry section in carrying on the safety work. These added members are:

A. J. R. Curtis, Portland Cement Association.

Otho M. Graves, president, National Crushed Stone Association.

Warren S. Hayes, secretary, National Slate Association.

V. P. Ahearn, secretary, National Sand and Gravel Association.

N. S. Greensfelder, editor *Explosives Engineer*.

Meeting of the Cement Section

At the same time that the quarry section of the congress was in session, the cement section was called to order by Chairman F. E. Town, superintendent of the Manitowoc Portland Cement Co., Manitowoc, Wis. At the morning meeting two papers were presented by men prominent in the industry, and these were followed by considerable discussion. The first paper was given by E. Posselt, vice-president of the International Cement Corp., New York City. The paper covers a number of excellent points in safety work in the industry and is presented in part on another page of this issue for the careful study of the readers of Rock Products.

W. N. Clinton, staff engineer of the Policyholders Service Bureau, Metropolitan Life Insurance Co., delivered a paper on "Accident Prevention and Insurance." A growing interest is being manifested in accident prevention on the part of insurance companies, Mr. Clinton declared, because it is becoming recognized that the function of insurance as a preventer of loss is equally as important as its function as distributor of loss. Modern competition in the field of industrial insurance is so great that the companies must depend on the service which they can render to meet this competition,

since casualty rates are always practically identical. It is natural that this service should take the form of assistance in the prevention of accidents since by cutting the number of accidents both the insured and the insurance company are benefited. Through this service, rates for insurance can be reduced, since an insurance company can afford to provide a lower rate where there is less risk involved. In such fields as the cement industry where so much advancement has been made in safety work, the premium rate naturally becomes lower, benefiting all in the industry through this merit-rating system.

Two tests can be applied to determine the effectiveness of the safety program in its relation to insurance costs, Mr. Clinton said. The first, from the viewpoint of the insurance company, is: How much does the company have to pay back to the insured for claims? The second test, from the point of the insured, is: How many employes are hurt and how badly, in comparison to injuries of previous years?

The procedure now followed by insurance inspectors and representatives is vastly different from what it was several years ago, Mr. Clinton said. At present the first thing a representative does upon entering a plant is to make a contact with the highest possible operating official and "sell" him on the idea of accident prevention. Too many officials feel that their obligation is ended when they have taken out insurance, although this is a fallacy since no form of insurance can prevent an accident. The representative then proceeds to study and analyze the plant's accident records. Thirdly, the insurance engineer should gain the co-operation of the supervisory force and foreman. In the fourth place a study of the plant's organization is made to determine the best safety plan to fit the particular case, and the fifth move is a study of the existing safety work to determine its effectiveness. The sixth step is the placing of mechanical safeguards, and the seventh and last step is another conference with the officials to discuss the findings. While the above procedure is taken from the insurance man's point of view, it is readily understandable to the operating man and should help each in getting to know the other better.

Election of Officers of the Cement Section

Following the discussion of the two preceding papers, the cement section held its election of officers for the coming year. F. E. Town, presiding chairman of the section, was unanimously named to hold the office for another year. Edward Parry, of the Glen Falls Portland Cement Co., Glen Falls, N. Y., was elected vice-president, and A. J. R. Curtis, assistant to the manager, Portland Cement Association, was again elected secretary.

The following committee chairmen were named:

Program committee, Frank Sass, Universal Portland Cement Co., Chicago.

Poster committee, R. B. Fortuin, Pennsylvania-Dixie Portland Cement Co.

Membership committee, Major Henry A. Reninger, Lehigh Portland Cement Co.

Engineering committee, S. L. Harrison, Vulcanite Portland Cement Co.

Cement and Quarry Joint Luncheon

Following the morning sessions of the cement section and quarry section, a joint luncheon was held for the combined groups. Beside the usual good-fellowship of the get-together meeting, there was an exceptional address delivered by R. P. Blake, sales engineer for the Independence Bureau of Philadelphia. Mr. Blake opened his talk by statting that what was the greatest wrong now found in safety work was that despite the work of the council so many industries had not yet seen the light of safety. He pointed out that enough organizations in all industries have achieved sufficient results to prove that safety is possible if any attempt is made, and also to show that it pays in dollars and cents when a measure of success is reached. The indirect costs of the accidents are the big feature, Mr. Blake said, since they throw the whole plant out of its ordinary routine procedure. The accidents to men, while the most important, are not the only ones to be considered, since an accident to a machine will also stop the regular routine of the operation. The value of the safety organization is also shown in its usefulness in other departments of operation where an organized group is beneficial to the industry. Another point Mr. Blake stressed was that it was incorrect to think that a safety movement or organization could not work just as effectively in a small plant as in a big operation. The chance for personal contact is much better in the small organization, he stated.

Mr. Blake gave a number of points to be remembered in organizing safety work as follows:

1. Accidents can be prevented.
2. Accident prevention pays.
3. Anyone can accomplish results. (Any organization that is strong enough to live under the present competitive conditions is strong enough to maintain a good safety record.)
4. It is human nature to neglect the small hazards.
5. To start the movement, the executive must be reached.
6. To convince the executive he must be shown that it is a chance to make and save money.
7. Before effective work can be done the executive must want safety.
8. The organization must be welded into one unit.

Continuing on his theme, Mr. Blake stated that safety in a plant is not the function of a committee or a supervisor with little authority. Discipline must be obtained, because human nature dislikes routine, and the men want to take chances, frequently for the sake of accomplishing something which they believe will benefit the company. Argument should be put forward to convince the men that they can afford to abide by routine during working hours, so that they will be free to take all the chances they desire in their off time.

Five essentials were given by Mr. Blake for a good safety organization, namely, imagination, attention to detail, open-mindedness, an outside viewpoint and persistent patience. In concluding his address he said that two things were becoming more outstanding in the safety movement all the time. These were that safety was more than ever becoming considered the function and the responsibility of every executive, and, secondly, that the plant which did not have a good safety record was being considered in the same class as the one which produced a poor and inferior product.

Joint Session of Cement and Quarry Sections

Following the joint luncheon of the quarry and cement sections, a combined meeting of the two sections was held on the afternoon of October 2. J. R. Cline, assistant to the superintendent, Universal Portland Cement Co., Pittsburgh, Penn., spoke on "Putting Safety Across in a Cement Plant." He outlined the plan as put across in his own plant, saying that the first step was the placing of mechanical guards, the next the placing of bulletin boards with good safety displays, the third was maintaining the plant in an absolutely clean condition, and finally that sufficient proper lighting should be installed. These four mentioned necessities only cover the physical side of accident prevention, and following this the education of employes must be carried on, and an attempt made to secure their heartiest co-operation. This is best done by holding safety meetings, and in Mr. Cline's plant it was determined to hold meetings in subdivisions, and to have a general safety committee of all of the foremen. There was also a specially selected group of men known as safety officers who also hold regular meetings, to hear safety discussed and to ask questions. Finally at the superintendents' meeting, safety is one of the chief topics discussed. Each item reported at any meeting is entered on a form prepared for that use and copies are received by the assistant superintendent, the head of the department involved and by the workmen who corrects the trouble. More than 2000 of these items were recorded in 1927. In addition to the above measures, a special committee of picked men makes an inspection of the plant twice a year.

The company also maintains good locker rooms, has periodic physical examination of employes, has a nurse who investigates employes' sicknesses and provides a doctor and a well-equipped hospital, Mr. Cline stated. Safety schools are maintained and workers urged to be present at the Regional Safety meetings of the Portland Cement Association. The plant also has a Thanksgiving

No-Accident drive in November. Visiting other plants to obtain new ideas on safety is urged, but the plant relies for its big success in putting safety across, upon the cooperation of the foreman and workman, particularly the former.

There followed a paper by C. L. Baylor, assistant safety director of the Louisville Cement Co., Speed, Ind., on the "Mental Causes of Accidents." Statistics were presented showing causes of accidents and telling of the work which the Portland Cement Association was carrying forward in coordinating these accident statistics and using them in combating similar accidents in the future. Specific examples of the decline in various types of accidents were given. He gave particular emphasis to the work of the Portland Cement Association for its part in changing the cement industry from one of the most hazardous to one of the safest in the world, and spoke of the record of his own company and of the means employed in obtaining that record.

Discussion of Joint Session Papers

A round table discussion followed the presentation of the two papers, led by S. Henry Harrison, assistant superintendent of the Vulcanite Portland Cement Co., Phillipsburg, N. J. He spoke of the great economic loss involved in the payment of compensations every year, a problem which even the least humanitarian operator must face. The work of the cement industry has been gratifying, he said, stating that at present the industry is in a transition stage, changing to equipment of the safest modern design. Mr. Harrison suggested that the number of accidents was directly proportional to the amount of machinery installed, or to the number of men employed. Power plants are being replaced by power lines, multiplicity of drive equipment is being supplanted by simple power transmission machinery and in similar ways the plants are being made safer every day.

Mr. Harrison called attention to the fact that with the increase of use of electricity there is an increasing number of low-voltage electrical accidents. Not infrequently such accidents have resulted fatally, he stated, and for this reason it would be well for the industry to give more careful study to the problem. He also called attention to the number of accidents from men "sky-larking" or practical joking, some of which have resulted very seriously, but stated that in a properly regulated plant such actions would never be tolerated. Mr. Harrison concluded his remarks by urging that all accidents be reported, since an apparently trivial accident may result seriously, and in such a case it is often impossible to tell whether the accident occurred at the plant or at the empolye's home.

Reports were given by a number of the cement companies as to their accident prevention campaign.

A. C. Jewett, of the American Lime and Cement Co., inquired if any operator knew of a really safe totally shielded extension cord for electricity, which created some discussion but no definite answer to the question. H. D. Fraser of the Charles Warner Co. stated that he had found that one of the chief troubles with electricity around a quarry was to obtain a good ground. R. B. Fortuin, of the Penn-Dixie Cement Corp., said that the results obtained in his organization were due to bringing out the same old idea in new clothes at frequent intervals. The first step for safety, he said, was to start a "good-housekeeping" campaign.

Thomas Quigley, of the Department of Safety of the state of Pennsylvania, stated that no industry in his state had accomplished as much for safety as had the cement industry. He cited figures indicating a 25% reduction in fatal quarry accidents in that state for the first eight months of 1928, compared with the same period for 1927. He added that the safety work of the cement industry had definitely started similar work in other quarries of the state, so that the accident prevention was becoming more advanced all of the time.

Mr. Atwell, of the Lawrence Portland Cement Co., suggested that the men frequently do not grasp the idea that the foremen are trying to impart. If a man is asked why he ought to use safe methods and he replies that it is because he is told to do so, then the work is only partially accomplished. The idea should be put across to the men so they can understand.

Mr. Cline said that at his plant the men are given two physical exams a year, and Mr. Mori of the Cleveland Stone Co. said his company provided a physical exam for workers, and if it was found that the men were not fitted for the work they were doing, they were transferred to a less hazardous job.

Considerable discussion was brought out by the statement of H. W. Heinrich, assistant supervisor of the Engineering Division, Travelers Insurance Co., that the criterion for the discussion of accidents should not be the lost-time accident but any accident at all. He said that given a set of conditions which would bring about an accident, it was only a matter of luck as to whether the accident was trivial or serious. G. A. Davis, of the Universal Portland Cement Co., took exception to Mr. Heinrich's statement that there could be any luck in safety work, but the majority of the representatives at the meeting agreed that luck as used in that sense was correct. Obviously the thing to do then was to work to cut out all accidents, and not merely lost-time accidents.

Since this joint meeting was found to be so advantageous to both the quarry representatives and the cement men, the last suggestion made before the meeting was that in the future the special sessions of the two sections be held at separate times so that the representatives of each group could attend the session of the other. At this congress the sessions were held at the same time. Mr. Harrison commented on the valuable suggestions of the meeting, remarking that after all the value of the meeting lay in the suggestions as to how safety was accomplished and not in the statements of plants as to what their record had been.

Safety Congress Banquet

One of the most important affairs of the whole congress was the banquet given at the Commodore hotel on the evening of October 3. Hon. Grover A. Whalen, chairman of the New York mayor's committee on reception, acted as toastmaster, and two well known speakers addressed the gathering, which was the largest of the whole convention.

At the banquet, the report of the nominating committee for officers of the National Council was read. The cement industry and the rock products industry generally should feel happy that the council honored one of their own representatives, Major Henry A. Reninger, with the office of president for the coming year. Major Reninger has been active in the work of the council for a number of years, and has just completed a term as vice-president in charge of membership. He is special representative for the Lehigh Portland Cement Co., Allentown, Penn., and has been widely known in the industry both because of his work for safety and because of his other interests in the field. The portland cement industry may well take this election of Major Reninger as a compliment to its active and uniformly successful work toward accident prevention.

Rabbi Stephen A. Wise, of New York City, a nationally known figure, addressed the gathering and expressed his surprise at what immense proportions this congress had reached. He said that he know that accidents had been reduced in some lines to an almost unbelievable extent, but that the end was not yet. He then stressed the point that there was nothing more flexible than the so-called "irreducible minimum" of accidents. He concluded his talk with the thought that the old expression, "Am I my brother's keeper?" is being changed to "I am my brother's keeper," through the work of the safety congress.

Isiah Hale, safety superintendent of the Santa Fe railroad, delivered the final address of the evening. He declared that because the interest of management had been aroused and managerial direction was afforded, the movement had received life. It is a moral obligation for an executive to acquaint his employes with safety details, and at the same time he must show his willingness to go hand in hand with the workers to secure better conditions. Safety must boil down from the top, as it can never bubble up from the bottom. Since this is so, the key men in any plant are the foremen, for only through them can safety be obtained.

Hints and Helps for Superintendents

Mud Capping Large Rock on Cars at Stolle, Ill.

THE initial crushers at the two crushing plants of the Casper Stolle Quarry and Contracting Co., Stolle, Ill., are both Allis-Chalmers No. 8, which is a comparatively small initial breaker for shovel loaded rock. During the loading some of the larger rocks are shoved to one side and shot. The smaller stone, but still of size that will not pass crusher opening,

Mud-capping on cars saves time but is hard on cars

are loaded on the top of the rock cars with the fines underneath and are switched to a convenient point where the larger top pieces are mud-capped and shot just as they lie on top of the cars.

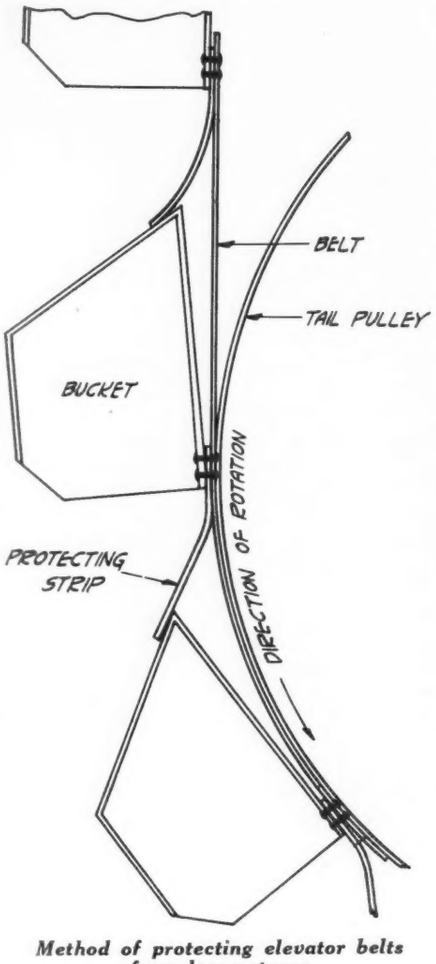
This method of shooting requires more powder and is somewhat hard on the equipment, but the company feels justified by the time it saves both at the crusher and at the shovel, neither operation being held up by the secondary shooting.

Protecting Bucket Elevator Belts From Loose Stones

WHEN a bucket elevator of large capacity is constructed with the usual type bucket riveted to the rubber or composition belt, the rivets, usually two rows a few inches apart, are placed near the top edge of the longitudinal side of the bucket in such a position that in reality the bucket hangs to the belt. Close spacing of the rivets is necessary, especially if the head and tail pulleys are of small diameter, as wide spacing under this condition would result in one row pulling out as the bucket passed over the pulley. When the bucket is at the pulley, its bottom pulls away from the belt leaving a wedge shaped opening, which on the down, or return side, affords a lodging place for any falling rock. When a piece of rock gets in behind the bucket, and passes over the pulley, the rivets are pulled at that point, or the belt is punctured, or both. It is a common sight to see an elevator belt in poor condition from this cause.

To correct this, it is a simple matter, especially when erecting the belt, to slip between the bucket and the belt a strip of old belting in the manner as indicated in the drawing. This need not be heavy belting, as any ply will do. It can be fastened with the rivets supporting the buckets or by three or four independent rivets. This arrangement effectively closes the gap in all the positions of the bucket over the head and tail pulley.

This is not a very unique suggestion, but it is one that many plant operators apparently overlook, judging by observations in much traveling about among plants.



Method of protecting elevator belts from loose stones

Specially protected belt and bucket elevators at Edward Hely Stone Co., Cape Girardeau, Mo.

Diesel-Electric Drag-Line Performance

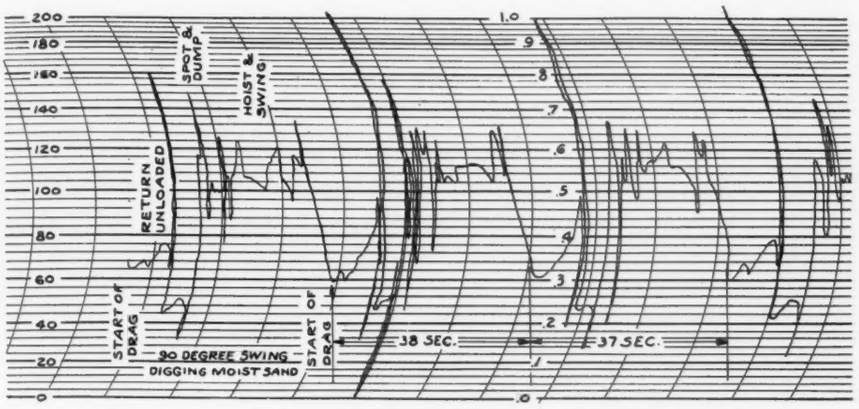
WITH narrowing margins of profit and keener competition for cost reductions it is becoming necessary to study the performance of individual pieces of equipment and machinery, as well as the efficiency of operators as a whole. It is doubtful if many rock products producers have reached that degree of refinement in cost reduction studies, but they may have to soon. Consequently cost data and performance records of equipment used in the rock products industry are useful and helpful. The following data are from a recent issue of *F-M News*, the house organ of Fairbanks, Morse and Co., Chicago, Ill.

The equipment referred to is a Bucyrus-Erie, Class 24, Diesel-electric drag-line excavator, owned by the Walsh Construction Co., Davenport, Ia., working on railroad grading in Ohio. The machine is powered with a 180-hp., Model 32-2 F-M Diesel engine, direct-connected to a 120-kw., 250-volt, 460-ampere, direct-current generator. The drag-line was designed for a 4½-yd. bucket, but is using a 5-yd. bucket. The drag-line is stripping 10 ft. of dirt for a fill; 15-yd. dump cars and steam dinkies are used for taking way the spoil.

A detailed study of its performance was recently made by using a recording wattmeter and a section of one of these wattmeter charts is shown in the accompanying illustration.

In dry sand the cycle of operation is completed in from 30 to 34 seconds and when moist sand is being handled the time varies from 36 to 38 seconds.

The stalling load on the drag motor is approximately 600 amperes at 200 volts. The voltage at the beginning of the drag rises to approximately 280. On the hoist and swinging operation the hoist motor requires from 370 to 450 amperes and the swing motor from 50 to 100 amperes at voltages between 200 and 260. The engine speed when running light is approximately 273 r.p.m. and with the drag motor stalled the engine speed drops to between 253 and 255 r.p.m.



Record of drag-line performance made by a recording watt-meter

A study of the graphic record will show that at the beginning of the drag the output of the generator is 60 kw. and it increases rapidly to a maximum of slightly over 200 kw. when handling moist sand. During the spot and dump period the peaks rise to about 150 kw. and during the hoist and swing period the kilowatts required varies from about 90 to 130.

No accurate records were kept of the consumption of fuel and lubricating oil, although the operators stated that the average daily consumption was 3½ to 4 bbl. of 52 gal. per 24 hours. Approximately one barrel of lubricating oil is being used per week. The dredge is operating approximately 22 hours per day of two 11-hour shifts and only one 11-hour shift on Sunday. The fuel oil in use at the time this study was made was 32-36-deg. Baume-Paragon oil costing 8½ c. per gal. delivered at the drag line. The lubricating oil was "Mobiloil A" manufactured by the Vacuum Oil Co.

The engine is equipped with a "Protecomotor" industrial air filter having a rated capacity of 1000 CFM. type D-1000 No. 5727 manufactured by the Staynew Filter Corp., Rochester, N. Y.

At the time of this report the record loading had been 252 cars per shift, each car having a net load of between 13 and 14 cu. yd. The Walsh Construction Co. expects to move approximately 175,000 yd. of dirt during one month.

Radiators and fans are used for cooling the circulating water, the fans being 54-in. diameter and are driven by motors of variable speed type, so that the temperature may be regulated at all times.

Chutes to Reclaim Material Dropped from Conveyor Belts

WHEN a conveyor belt runs full of material there is very likely to be considerable of the smaller particles that are spilled. This was particularly true at the sand plant of the Consumers Co. at South Beloit, Wis., where an 18-in. belt had been fitted with 3-in. side pieces to increase its capacity. This conveyor carries the new material from the track hopper to the scalping screen. To prevent the sand dropped beneath the conveyor from becoming a nuisance and to reclaim as much of it as was possible, a series of V-shaped chutes were built between the bents of the conveyor structure. As the tops of these chutes reach the bents at either side and touch the top of the next chute at that point, it can be seen that all of the area below the belt conveyor is covered and all the sand saved. These chutes empty into the small conveyor, which returns the discharge from the crusher below the scalping screen to the main belt conveyor. The arrangement is clearly shown in the accompanying illustration.

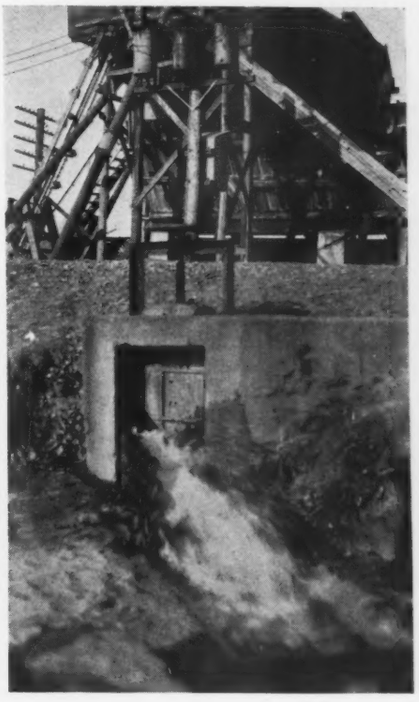
A scheme for saving the droppings from a conveyor belt

Passing Waste Flume Through a Levee

PLANTS ALONG many rivers in the Mississippi Valley have to be protected by levees against a rise of the water. So they are enclosed in levees. As the waste water from the plant is returned to the river some arrangement has to be made to keep the flood water from getting inside the levee by passing through the waste way.

A very neat arrangement used at a plant on the Arkansas river is shown in the picture. The waste water is carried out through a concrete box which is carried far enough away from the levee so that there is no danger of any disturbance of the levee by the cutting of the stream. At the end of the box is a regular sliding gate of the type used in hydraulic work. This one is about 30 in. wide.

The gate only comes into use when the river is in flood and the water is so high that the waste water from the sand-washing plant cannot be run into the river.



How Mississippi river levees are protected from sand and gravel plant waste water

Effect of Sulphate Waters on Concrete

ONE of the most important papers presented at the June meeting of the American Society of Testing Materials described experiments in the effect of sulphate waters on concrete made from different brands of portland cement. The paper was briefly abstracted in the report published in ROCK PRODUCTS for July 7, 1928, together with an abstract of the discussion that followed. The author of the report, Dalton G. Miller, drainage engineer, United States Bureau of Public Roads, has since published the report in full in *Public Roads*. The full report covers eight pages and about half of the space is given to charts and tables showing the results of the experiments in the full detail.

Thirty makes of cement were tested by immersing cylinders of 1:2:4 concrete in solutions of $MgSO_4$ and Na_2SO_4 and cylinders from 22 of those tested in the laboratory were checked by immersion in the water of Medicine Lake, S. D., which contains from 2.34% to 4.72% of salts (almost wholly $MgSO_4$ and Na_2SO_4) according to the season. The results of such immersion were then compared with the physical characteristics and chemical analyses of the cements as disclosed by the ordinary laboratory methods.

Could Draw No Definite Conclusions

In a general way the effects of the immersion in laboratory solutions and natural sulphate waters were enough alike so that one could be said to check the other, although they were not identical. But in the comparison of these results with the physical and chemical characteristics nothing certain developed. There was some evidence to show that cements low in alumina and high in iron oxide were the more resistant, (and this was a point especially discussed at the A. S. T. M. meeting), but there were some notable exceptions to the rule. Calculation of the lime-silica index for each cement developed no differences that could be related to sulphate water resistance. Neither did a study of the fineness to which the cement was ground. A special fineness test was made on seven of the cements because of the extreme showing made under exposure conditions, but the difference in fineness found was so slight that it could not account for the differences in the cements.

The author suggests that the differences in resistance to sulphate waters may come from the geological differences in the raw materials. He finds some justification for what he admits is a mere guess in grouping the cements made in the same localities or from raw materials that are known to be alike.

The paper brings out the great need for an accelerated test for the action of sulphate waters. It is the author's conclusion that so far the best test is that which was developed in the course of the experimentation. It consists in immersing the briquets broken in making the standard strength test in a 1% solution of Na_2SO_4 for a period of six months. In the laboratory work immersion in 1% solutions of both Na_2SO_4 and $MgSO_4$ were tried, but the disintegration was found to have proceeded much farther in the Na_2SO_4 solution. There should be at least one gallon of solution for every 15 briquets and the solution should be changed at least every four weeks and the room temperature kept at about 72 F. to conform with the conditions which obtained in the tests.

Briquet Test

Briquets which show more than a slight surface disintegration after such an immersion should be considered to have failed and the cement from which they were made as unfit to use where it will come in contact with sulphate waters. A comparison of the results obtained by this briquet test with the results obtained with the immersed cylinders shows that the acceptance or rejection of any of the cements from the briquet test would have been justified. The author concludes that this may serve as a standard test until some method of accelerating the action is found. Experiments to that end are reported to be in progress.

In making these tests every precaution was taken to exclude any other factor than the resisting power of the cement from influencing the results. The aggregates were screened and recombined to produce a fineness modulus of 4.67. The consistency was held at 1.0 and the water cement ratio was between 0.59 and 0.64, and all the conditions of curing and storing were uniform.

Although this is not brought out in the paper, it seems worth noticing here that several of the cements showed a fairly good (although lessened) strength after a year's immersion in Medicine Lake and two of the cements showed practically no loss in strength.

Some other points in connection with this investigation are discussed on the editorial page of this issue.

Mexican Cement Makers Ask Prohibitive Duties

THE IMPORTATION of portland cement coming from the United States and Belgium will cease if President Calles accords favorable consideration to the request of Mexican cement manufacturers who ask that prohibitive duties be imposed on foreign cements. The matter has been brought before the Minister of Hacienda and, according to report, President Calles will take it up and settle it one way or the other.

The Mexican manufacturers complain that there are being imported great quantities of the product to build the bridges and highways that are now under construction, and also that the greater part of the material used in the construction of dams and industrial works is of foreign origin.

There are in Mexico several large cement plants, and unless aid is given to the industry by the imposition of duties on cement coming from outside the country these plants, according to what is asserted, will have to close their doors.—Spanish Section of *Los Angeles* (Calif.) *Times*.

Western Lime and Cement Co. Closes Hamilton, Wis., Quarry

THE QUARRY at Hamilton, Wis., owned by the Western Lime and Stone Co., Milwaukee, Wis., has shut down for an indefinite period and all machinery is being stored.

E. E. Long of Fond du Lac, plant superintendent for the company, said that the closing of the quarry is only temporary and that the company plans to place it in operation again next year. Due to the fact that other plants owned by the company have been enlarged to care for a greater production, the output of the Hamilton plant is not needed at this time, he said.

The tendency in the lime industry at present, according to Mr. Long, is to obtain a greater production at a smaller number of plants. While his company has felt to some extent the depression that prevails in the lime industry throughout the country today, this was not a factor in closing down the Hamilton quarry, he said.

The closing of the quarry at Hamilton at this time, it is said, is the first time that it has been completely shut down since work was started there by an individual operator about 40 years ago. The quarry was later taken over by the Union Lime Co. and soon after the World War passed into the hands of the Western Lime and Stone Co. through a consolidation.

Although the quarry has been the scene of extensive operations, enough stone remains there to provide capacity operation of the present plant for many years to come. At one time as high as 65 men have been employed at the quarry and only two years ago a payroll of 40 men was at work. During the last summer, only eight men have been working at the quarry and were employed in the production of crushed stone.

Some of the employes remaining at the Hamilton quarry have been working there continuously for 30 years or more. The older employes will be given an opportunity to work for the company at some of its other plants, Mr. Long said. Some of them will probably go to the Marblehead plant, it was said.

Louis Anderson, who has been superintendent at the Hamilton quarry for 21 years, will remain there to take care of the retail business that the company will continue to handle there, it was said.—*Fond du Lac* (Wis.) *Reporter*.

Editorial Comment

Chance for Cement Manufacturers

Dalton G. Miller's paper on the resistance of different portland cements to the action of sulphate waters, which was published in *Public Roads* for June, 1928, and abstracted in this issue of ROCK PRODUCTS shows that the subject is still a fertile field for investigation. The effects of sea water and sulphate water have been studied almost as long as portland cement has been in use, but we seem to be as far away as ever from the reason why one portland cement is more resistant than another. Not that such a study has been barren of results; we owe the invention of high-alumina cements to it. But this is in the nature of a byproduct and not the end toward which research was directed.

Two of Mr. Miller's specimens showed a satisfactory resistance after a year's soaking in the sulphate water of Medicine Lake, and this is hopeful if not conclusive evidence that standard portlands which have the required resistance may be generally made. It is true that comparison of resistances with physical characteristics and chemical analyses developed nothing, but this means that the study has not gone deep enough. Mr. Miller suggests that the differences are due to geological differences in the origin of the raw materials. The suggestion may be valuable as indicating a good starting point for further investigation, but to speak of the differences as "geological" is only dodging the question. All geological differences finally resolve themselves into chemical, physical and physiochemical differences which in the end must be discoverable.

Nothing was said in the paper of differences in the methods of the manufacture of the different cements. Portland cement making is fairly well standardized, but not wholly so and other important differences may be traced to differences in the method of manufacture.

When this paper was presented at the June meeting of the American Society for Testing Materials it was earnestly discussed for as long a time as the presiding chairman would permit, which shows that cement makers and users are thoroughly interested in the subject. They have reason to be. While it is true that damage from sulphate waters is usually to be feared only in those regions of scanty rainfall which are not densely populated, it is also true that some of the most important concrete construction goes on in those regions, such as dams for hydro-electric projects. Also resistance to sulphate waters is probably a quick method of indicating resistance to sea water.

No Apologies Necessary

The editor recently sat in on a monthly meeting of a local association in the rock products industry. The subject discussed was how and "how much" the members of this association should support propaganda to get an affirmative vote on a proposed $100,000,000 state highway bond issue. Obviously, the adoption of this bond issue meant a great deal to every producer present. Yet there seemed a general feeling that any support given to help carry the measure with the voters should not be done openly.

As an entirely disinterested listener—and we believe a public-spirited citizen—we could not see why there was any reason for going about a job like this with a conscience-stricken attitude. For enough was said, incidentally, to prove that this state's investment in $100,000,000 worth of additional paved highways would be a sound one. It was said that the bonds would ultimately cost about $2.60 per $1, with interest and retirement. It was said that the state highway engineers had proved that the public would get about $3.50 per $1 invested in decreased cost of transportation and other savings and conveniences.

It speaks well for this or any other group of men in industry to consider first of all their duties as honest and upright citizens, for no expenditure by the public is benefitial to them as producers in the long run, which is not fully justified on grounds of public economy. On the other hand, if the expenditure is justified it is their plain duty as just and honest citizens to advocate it, from either selfish or unselfish motives. Honest citizens of all classes, if they stop to consider the case at all, will see that if those most interested, or selfishly interested, in the bond issue *do not* actively support it, there must be something wrong somewhere.

Selling the public a bond issue is no different than selling your customers a carload of stone, gravel, cement, or what not. If you believe in the product, and in its merit, why should you not got forth openly and proclaim your faith in it? The more openness and frankness, the more successful will the effort be in this, as in all other branches of salesmanship.

Just a Moment—

"I HAVE never known a concern to make a decided success that did not do good, honest work, and even in these days of fiercest competition, when everything would seem to be a matter of price, there lies still at the root of great business success the very much more important factor of quality."

—ANDREW CARNEGIE.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.	10- 8-28	44	46	75c qu. Oct. 15
Alpha P. C. pfd.[2]	10- 8-28	117	.....	
Amer. Aggregate 6's, bonds	10-10-28	107	109	
American Brick Co.	9-29-28	.....	17⅞	
Am. L. & S. 1st 7's[32]	2-24-28	101¼	102½	
American Silica Corp. 6½'s	10-10-28	96	100	
Arundel Corp. new com.	10-10-28	37¾	38	50c qu. Oct. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	10-10-28	90	91	
Atlas P. C. com.	10- 8-28	39	41	50c qu. Sept. 1
Atlas P. C. pfd.	10- 8-28	47	49	66⅔c qu. July 2
Beaver P. C. 1st 7's[30]	10- 4-28	97½	100	
Bessemer L. & C. Class A[4]	10-10-28	34¾	36	75c qu. Nov. 1
Bessemer L. & C. 1st 6½'s[4]	10- 5-28	100¾	101	
Bloomington Limestone 6's	9-29-28	96	.....	
Boston S. & G. com.[16]	10- 5-28	76	80	$1 qu. July 2
Boston S. & G. 7% pfd.[16]	10- 5-28	83	85	1¾% qu. July 2
Boston S. & G. Co. 1st pfd.[16]	10- 5-28	93	95	2% qu. July 2
Canada Cem. com.[43]	10- 9-28	26¼	27	
Canada Cement pfd.[43]	10- 9-28	98	99	1.62½ qu. Sept. 30
Canada Cement 5½'s[43]	10- 5-28	102	102½	
Canada Cr. St. Corp. 1st 6½'s	10- 5-28	95	99	
Canada Gyp. & Alabastine	10- 9-28	73½	74	75c Oct. 1
Certainteed Prod. com.	10-10-28	39⅞	40	$1 qu. Oct. 1
Certainteed Prod. pfd.	10- 9-28	96	96½	1.75 qu. Oct. 1
Cleveland Stone new st'k	10-10-28	52	60	50c qu. Sept. 1 & 25c ex.
Columbia S. & G. pfd.	10- 9-28	92⅛	92¾	
Consol. Cement 1st 6½'s, A[42]	10-10-28	94	99	
Consol. Cement 6½ notes[24]	10-10-28	92	95	
Consol. Cement pfd.	10-11-28	40	60	
Consol. S. & G. com. (Canada)	10- 5-28	13½	14	
Consol. S. & G. pfd. (Canada)	10- 5-28	84½	85	
Consumers Rock & Gravel, 1st Mtg. 6's, 1948	10- 4-28	97	99½	
Coosa P. C. 1st 6's[22]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	10- 8-28	90	.....	
Coplay Cem. Mfg. com.[40]	10- 8-28	12½	.....	
Coplay Cem. Mfg. pfd.[40]	10- 8-28	72½	.....	
Dewey P. C. 6's[30]	10-10-28	99	102	
Dolese & Shepard[7]	10-10-28	140	145	$2 qu. Oct. 1; $1 ex. Oct. 1
Edison P. C. com.[19]	9-21-28	10c	.....	
Edison P. C. pfd.[19]	9-21-28	50c	.....	
Edison P. C. bonds[19]	9-21-28	75	.....	
Fredonia P. C. 1st 6½'s[32]	12-28-27	97	101	
Giant P. C. com.	10- 8-28	25	30	
Giant P. C. pfd.	10- 8-28	33	36	3½% June 15
Ideal Cement, new com.	10-10-28	73	75	75c Oct. 1
Ideal Cement 5's, 1943	10- 6-28	102	104	
Indiana Limestone 6's	10- 8-28	89	90	
International Cem. com.	10-10-28	70	70¾	$1 qu. Sept. 28
International Cem. bonds 5's	10- 8-28	96¼	97	Semi-ann. int. payable June 15
Iron City S. & G. bonds 6's[46]	10- 5-28	98	98½	
Kelley Is. L. & T. new st'k	10-10-28	52½	54	62½c qu. Oct. 1
Ky. Cons. Stone Co. com.[45]	10- 4-28	13	15	
Ky. Cons. St. com. Voting Trust Certif.[45]	10- 4-28	13	15	
Ky. Cons. Stone 6½'s[45]	10- 4-28	96½	100	
Ky. Cons. St. Trustee Certif.[45] (1 sh. 7% cum. pfd. & 1 sh. com. stock)	10- 4-28	100	103	$1,75 Aug. 1
Keystone Sand & Sup. 6's[47]	8-22-28	99	100	
Lawrence P. C.[2]	10- 8-28	95	100	2% qu. Sept. 29
Lehigh P. C.[2]	10-10-28	46	46½	62½c qu. Nov. 1
Lehigh P. C. pfd.[2]	10-10-28	107	109	1¾% qu. Oct. 1
Lyman-Richey 1st 6's, 1932[18]	9-21-28	98	100	
Lyman-Richey 1st 6's, 1935[18]	9-21-28	97½	99½	
Marblehead Lime 1st 7's[14]	10- 5-28	100	.....	
Marbleh'd Lime 5½'s, notes[14]	10- 5-28	98	.....	
Mich. L. & C. com.[19]	10- 8-28	35	.....	
Missouri P. C.	10-10-28	43	43½	50c qu. Aug. 1
Monolith Midwest[9]	9-14-28	8	9	
Monolith P. C. com.[9]	10- 4-28	14½	15¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	10- 4-28	9	9½	
Monolith P. C. units[9]	10- 4-28	32½	34¼	
National Cement 1st 7's[28]	10- 8-28	99	101	
National Gypsum A com.[35]	10-10-28	.....	20	
National Gypsum pfd.[35]	10-10-28	.....	60	1¾% qu. Apr. 1
Nazareth Cem. com.	10- 5-28	28¾	32	75c qu. Apr. 1
Nazareth Cem. pfd.	10- 5-28	100	.....	
Newaygo P. C.[1]	12-30-27	115	.....	
Newaygo P. C. 1st 6½'s[32]	2-11-28	120	.....	
New Eng. Lime pfd., A[41]	10- 6-28	.....	90	
New Eng. Lime pfd., B[41]	10- 6-28	.....	75	
New Eng. Lime com.[41]	10- 6-28	.....	25	
New Eng. Lime 1st 6's[14]	10- 5-28	98	100	
N. Y. Trap Rock 1st 6's	10- 8-28	98⅞	99½	
North Amer. Cem. 1st 6½'s	10-10-28	70	.....	
North Amer. Cem. com.[19]	10- 5-28	7¼	8	
North Amer. Cem. 7% pfd.[19]	9-21-28	30	35	$1.75 qu. Aug. 1
North Amer. Cem. units[19]	9-21-28	30	40	
North Shore Mat. 1st 5's[15]	10-10-28	98½	.....	
Northwestern States P. C.[37]	10- 5-28	195	205	
Pac. Coast Cem. 6's. A	10- 4-28	96	98½	
Pacific P. C. new com.[5]	10- 5-28	18	22	
Pacific P. C. pfd.	10- 5-28	76½	79	1.62½ qu. Apr. 5
Pacific P. C. 6's	10- 4-28	98	100½	
Peerless Egyp'n P. C. com.[21]	10- 9-28	1½	2½	
Peerless Egyp'n P. C. pfd.[21]	10- 9-28	65	80	1¾% qu. July 1
Penn-Dixie Cem. 1st 6's[39]	10-10-28	94½	95	
Penn-Dixie Cem. pfd.[23]	10-11-28	83	86	1.75 qu. Sept. 15
Penn-Dixie Cem. com.	10-10-28	15¼	15½	50c qu. July 1
Penn. Glass Sand Corp. 1st 6's, 1952	10- 3-28	102½	103¼	
Petoskey P. C.	10-10-28	9¼	10¼	1½% qu.
Riverside P. C. com.	10- 5-28	15	.....	
Riverside P. C. 1st pfd.	10- 4-28	95	98	1.50 Aug. 1
Riverside P. C., A	10- 4-28	20	22	31¼c cum. part. Aug. 1
Riverside P. C., B	9-14-28	1½	3	
Rockland-Rockport Lime 1st pfd.[10]	5-17-28	.....	100	3½% s. a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[10]	5-17-28	.....	60	3% s.-a. Feb. 1
Rockland-Rockport Lime com.[10]		no market		1½% qu. Nov. 2
Sandusky Cem.	10-10-28	196	235	$2 qu. July 2
Santa Cruz P. C. bonds	10- 5-28	105¾	.....	6% annual
Santa Cruz P. C. com.	10- 4-28	90	.....	$1 qu. Oct. 1
Schumacher Wallboard com.	10- 5-28	17	19⅜	50c May 15
Schumacher Wallboard pfd.	10- 5-28	25¾	26	
Southwestern P. C. units[44]	10- 4-28	270	.....	
Superior P. C., A[20]	10- 4-28	48½	49	27½c mo. Aug. 1
Superior P. C., B[20]	10- 4-28	36½	37	
Trinity P. C. units[37]	10- 5-28	155	165	
Trinity P. C. com.[37]	10- 5-28	52	.....	
U. S. Gypsum com.	10-10-28	56½	58	2% qu. Sept. 30
U. S. Gypsum, pfd. pt. certif.	10- 9-28	46	.....	
U. S. Gypsum pfd.	10-10-28	125	.....	1¾% qu. Sept. 30
Universal G. & L. com.[3]	10-10-28	.....	1	
Universal G. & L. pfd.[3]	10-10-28	.....	10	1½% Feb. 15
Universal G. & L., V.T.C.	10-10-28	no market		
Universal G. & L. 1st 6's[3]	10-10-28	50	60	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	.....	
Vulcanite P. C. 1st 7½'s[32]	12- 5-27	105	109	
Chas. Warner com.	10- 8-28	33½	35½	50c qu. Oct 10 & 25c ex.
Chas. Warner pfd.	10- 8-28	108	.....	1¾% qu. Oct. 25
Whitehall Cem. Mfg. com.[26]	10- 5-28	150	.....	
Whitehall Cem. Mfg. pfd.[26]	10- 5-28	98	.....	
Wisconsin L. & C. 1st 6's[15]	10-10-28	100	.....	
Wolverine P. C. com.	10- 9-28	5½	6½	15c qu. Aug. 15
Yosemite P. C., A com.[50]	10- 4-28	5¼	5¾	

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [9]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [12]Nesbit, Thomson & Co., Montreal, Canada. [13]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47] Bank of Pittsburgh, Pittsburgh, Pa. [45]E. W. Hays & Co., Louisville, Ky.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pref. (sand-lime brick) 16 sh.[6]	par 25	25¾
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
International Portland Cement Co., Ltd., pfd.	30	45
Knickerbocker Lime Co.[4]	105	.....
River Road Sand and Gravel Co.,[9] 200 shares	$21 per share	
Simbroco Stone Co.,[10] 10 sh. pfd., par $50	$10.25 per sh.	
Southern Phosphate Co.[6]	1¼	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [8]Auction sales of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [10]Price at auction, June 6, 1928, R. L. Day & Co., Boston, Mass.

Consolidated Sand and Gravel Prosperous

EARNINGS of Consolidated Sand and Gravel, Ltd., for the period from May 15 to July 31, are officially reported at $87,210 before depreciation and taxes, against the quarterly dividend payment made August 15 on the preferred issue of $21,000.

At the same time it is officially pointed out the results for the period are not to be construed as an indication of the company's earnings power for the full year. The active period for building supplies extends from about April to the middle of November and then slackens off, and earnings in the off season cannot be expected to be quite as favorable as during the busy months.

The magnitude of construction operations in Canada is causing a heavy demand for Consolidated Sand and Gravel products, and the company is enjoying an increased volume of sales along with other kindred industries.

Lehigh Cement Company Retires Stock

THE Lehigh Portland Cement Co. retired on October 1, 7201 shares of preferred stock, already purchased at public and private sale. This is more than double 1½% of the maximum aggregate par amount of preferred issued to date, the amount which the company is obligated to retire and cancel annually under terms of issuance of the preferred. Cancellation of this stock reduces the amount required for preferred dividends by $50,407 a year.

Canada Cement Doing Well

THE Canada Cement Co., whose preferred and common stock have been listed on the Montreal Stock Exchange, is now operating its nine plants at a high rate, and sales and earnings are running considerably better the last year.

Last year sales were approximately 7,500,000 bbl. Although the report for 1927 has not been announced yet, it has been estimated that earnings were around $4,583,000.

The company's financial position has been improved this year through the sale of interest in its most important subsidiary, Consumers Glass Co., to Frank P. Jones, formerly president of Canada Cement. Although the price was not revealed, it is stated officially that it covered all that the Canada Cement Co. had put into the subsidiary. It is understood the sale was for $2,600,000.

Stock listed on Montreal Stock Exchange comprises 210,000 shares 6½% sinking fund cumulative redeemable preferred ($100 par) and 600,000 shares no-par common. Ahead of the capital stock the company has $20,000,000 5½% first mortgage bonds outstanding. Three quarterly dividends of 1⅝% each have been declared so far this year on the preferred, although no payment has been made on common. Listing application shows 5132 stockholders hold 210,000 shares of preferred and 3475 hold 600,000 shares of common.—*Wall Street Journal* (New York).

Listed on Stock Exchange

THE Baltimore (Md.) Stock Exchange has authorized the listing of $1,100,000 first (closed) 6% mortgage sinking fund bonds of the Iron City Sand and Gravel Co., Pittsburgh, Penn.

Pennsylvania-Dixie Cement Earnings

PENNSYLVANIA-DIXIE CEMENT CORP. reports for the eight months ended August 31 net income of $808,018 after depreciation, interest and federal taxes, equal after preferred dividends to 43 cents a share on 400,000 shares of no par common stock.

U. S. Asbestos Six Months' Net Income Is $273,322

UNITED STATES ASBESTOS CO. reports for the six months ended June 30, 1928, net income of $273,322 after depreciation, federal taxes, etc., equivalent after preferred dividends to $2.53 a share on the 100,000 shares of no par common stock outstanding. This compares with $159,177, or $1.39 a share for a similar period of 1927.

Sales for the first nine months of the year aggregated $2,767,000 against $2,231,000 in the corresponding period a year ago, an increase of $436,000, or 24%. September sales were $340,000 against $285,000 in September, 1927, a gain of $55,000.

The income account for the six months compares:

	1928	1927	Changes
Net operating profit	$333,984	$206,276	*$127,708
Depreciation	23,391	22,257	*1,134
Federal taxes	37,271	24,842	*12,429
Net income	$273,322	$159,177	*$114,145

*Increase.

President S. R. Zimmerman says that as of July 10, 1928, the company retired 11,313 shares of 7% cumulative participating preferred stock, par value $50, and issued in its place 5000 shares of 7% cumulative preferred stock, par $100.

The balance sheet as of July 1, 1928, after giving effect to recapitalization which took effect July 10, 1928, shows current assets of $1,409,881 and current liabilities $287,267, leaving net working capital of $1,122,614.

Assets—Cash, $306,833; United States Government Treasury certificates, $99,656; notes and trade acceptances receivable, $50,689; accounts receivable, $529,673; inventories, $458,028; prepaid expenses, $3848; investments, $33,451; plant and property less depreciation, $454,748; goodwill, $1; total, $1,901,932.

Liabilities—Accounts payable and acruals, $93,135; notes and trade acceptances payable, $108,140; 7% cumulative preferred stock, $500,000; common stock, *$600,000; surplus, $514,664; total, $1,901,932.—*Wall Street News*, New York City.

*Represented by 100,000 shares of no par value.

National Gypsum Company Business Expands

PRESIDENT J. F. HAGGERTY of National Gypsum Co., Buffalo, N. Y., in a letter to stockholders, reports substantial progress since the first half of the year, despite the trade war into which two of the large producers of wallboard entered and into which the whole industry was drawn.

During the seven months total dollar sales of National Gypsum Co. have increased 46% and total production was stepped up from 55,000 tons last year to 150,000 tons in the seven months of 1928.

The cost of making board during the period was reduced 24%, president Haggerty reports, reductions resulting from increased capacities and substitution of machinery for labor. Board capacity has been increased 20% and plaster capacity 75%.

The balance sheet reflects a sound financial condition. Since December 31, 1927, working capital has been increased over $250,000; cash as been increased $130,000, and $100,000 has been put into land, buildings and equipment.

Virginia Alberene Corp. Earnings

CONSOLIDATED earnings for the 12 months ended December 31, 1927, compiled from the audited statements of Virginia Alberene Corp., Alberene Stone Co., Alberoyd Corp. of America and the Nelson and Albermarle railway, were as follows:

Calendar years—	1926	1927
Gross profit from operations	*$324,753	*$380,308
Annual interest requirement on first mortgage, 7% bonds		† 105,000
Other deductions, includ. other interest, depreciation, depletion, amortization, etc.		98,175
Surplus available for dividends		$177,134

*Earning for the Alberoyd Corp. of America and Nelson & Albermarle Railway are included for the year 1927 but are not included for 1926 under the item, "gross profit from operations." †Includes interest on $42,000 principal amount of bonds held alive in sinking fund as of December 31, 1927.

This company makes soapstone or talc products.

Called for Redemption

The entire issue of **Connecticut Quarries Co.** (New Haven, Conn.) convertible 7s of 1940 has been called for redemption November 26, at 105.

The entire issue of **Ideal Cement** (Denver, Colo.) 7% preferred stock has been called for redemption on October 1 at 110.

Iron City Sand & Gravel Co., Pittsburgh, Penn., has called for redemption December 1, at 102½, entire issue of 1st 6s of 1930.

The entire issue of **Petoskey Portland Cement Co.** (Petoskey, Mich.) 6% serial notes, 1929-30, has been called for redemption December 1.

The entire issue of **Southern California Cement Co.** 35-year 1st 6s has been called for redemption on December 1 at 105.

UNIVERSITY OF MICHIGAN LIBRARIES

Pacific Coast Cement Mill Safety Meeting Is a Big Success

Portland Cement Association Continues Regional Meetings

ONE of the most successful regional safety meetings ever held under the auspices of the Portland Cement Association took place at the Palace Hotel, in San Francisco, on October 2, with practically all of the Pacific Coast cement mills co-operating. Although advance information indicated a probable attendance of less than 60, the actual number of mill representatives and special speakers reached 146. A total of 12 mills were represented, nine located in California, two in Oregon and one in Washington. Among the guests were California state officials, delegates from the California Society of Safety Engineers, members of the Pacific Coast staff of the U. S. Bureau of Mines, representatives of the insurance inspection and rating bureaus and power, illuminating and explosives engineers selected to discuss hazards relating to their particular fields.

The meeting was conducted by a committee of which W. H. George, secretary and general manager of the Cowell Portland Cement Co., was chairman. Mr. George presided at the morning session and J. H. Colton, vice-president and operating manager of the Pacific Portland Cement Co., at the afternoon session. George R. Gay, general manager of the Santa Cruz Portland Cement Co., presided very genially at the luncheon and Mr. George acted as toastmaster at the dinner, in the unavoidable absence of Robert B. Henderson, president of the Pacific Portland Cement Co., who had expected to serve.

The detailed program was as follows:

10:00 a.m. Meeting called to order, Concert room, Palace Hotel.

"Recent Progress of Safety Work in the Cement Industry"—A. J. R. Curtis, Portland Cement Association.

"Some Ways to Avoid Electrical Hazards in Cement Mill Practice"—W. C. Johnson, Westinghouse Electric and Manufacturing Co.

"Better Lighting as a Means of Greater Safety"—L. G. Gianini, Edison Lamp Works, General Electric Co.

"Avoiding Blasting Powder Hazards"—H. D. Gaskill, Hercules Powder Co.

12:30 p.m. Luncheon, Palace hotel, George R. Gay, general manager, Santa Cruz Portland Cement Co., presiding.

"How It Feels to Win the Association Safety Trophy"—E. D. Barnett, superintendent, Cowell Portland Cement Co.

1:30 p.m. Afternoon session, J. H. Colton, vice-president, Pacific Portland Cement Co., presiding.

Round table discussion of current safety problems, led by:

H. A. Henry, superintendent Calaveras Cement Co.

E. D. Barnett, superintendent, Cowell Portland Cement Co.

J. M. McClenahen, superintendent, Oregon Portland Cement Co. (Lime, Ore., plant).

H. R. Shipley, superintendent, Oregon Portland Cement Co. (Oswego, Ore., plant).

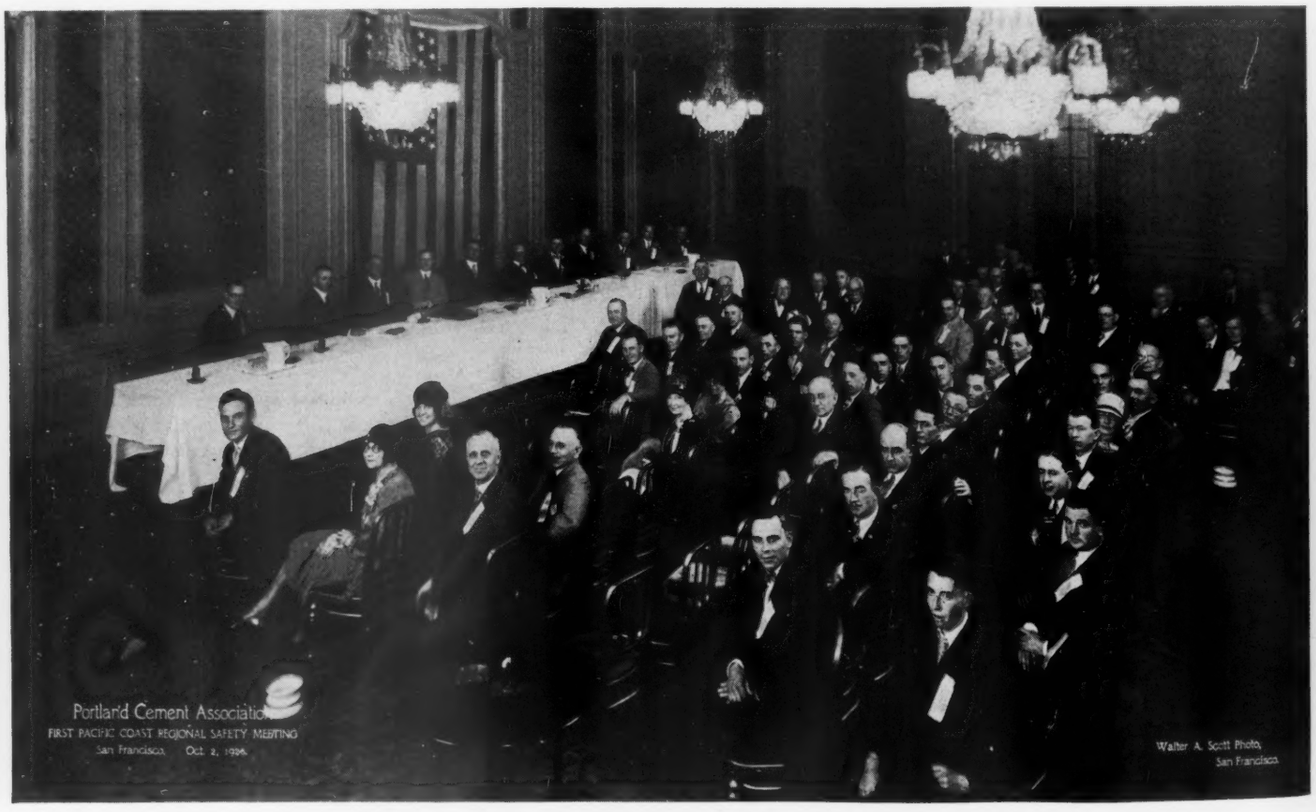
M. J. Johnsson, superintendent, Pacific Portland Cement Co. (Redwood City plant).

F. E. Parker, superintendent, Pacific Portland Cement Co. (San Juan Bautista plant).

A. S. Bilderback, safety engineer, Riverside Portland Co. (Crestmore plant).

Joseph Riordan, assistant superintendent, Santa Cruz Portland Cement Co.

P. Anthony, chairman, safety committee, Southwestern Portland Cement Co. (Victorville plant).


Portland Cement Association
FIRST PACIFIC COAST REGIONAL SAFETY MEETING
San Francisco, Oct. 2, 1928
Walter A. Scott Photo,
San Francisco

Pacific coast safety meeting at the Palace hotel, San Francisco, Calif.

H. A Ambler, superintendent, Superior Portland Co.

G. A. Fisher, superintendent, Yosemite Portland Cement Corp.

3:30 p.m. First Aid Competition—Grand ball room. Committee of judges from the California Safety Engineers headed by D. J. Parker, supervising engineer, U. S. Bureau of Mines, and Al Bull of the E. D. Bullard Co.

D. J. Parker

Competing teams:

COWELL PORTLAND CEMENT CO., Cowell, Calif.
Avila, Tony, captain.
Dermody, W. J.
Price, J. H.
Ryerson, Charles, judge.
Salazar, A., patient.
Sullivan, W. E.
Walker, E. J.

PACIFIC PORTLAND CEMENT CO., Redwood City, Calif.
Hall, K. C., judge.
Hewitson, J.
Hunt, J.
Norton, B.
Ray, R.
Ryder, T.
Stephens, Harry, captain.
Talkington, J.

PACIFIC PORTLAND CEMENT CO., San Juan, Calif.
Bond, Joe.
Carter, Shreve.
Dreisbach, Kenneth.
Durrin, Vernon.
Kurtyak, Andy.
Matus, John.
Norton, John.

SANTA CRUZ PORTLAND CEMENT CO., Daenvport, Calif.
Brownfield, A. T.
Huntsman, Al.
Rapp, F. A.
Riordan, Joseph, judge.
Scofield, E. G., captain.
Storts, J. D.
Tally, F. L., patient.
Whitesell, E. V.
Williams, T. P.

SUPERIOR PORTLAND CEMENT, INC., Concrete, Wash.
Baker, Fred, captain.
Buchanan, E. M.
Jungblom, W. F.
Lang, Ernest.
Lang, Robert.
McClellan, A. K.
Nelson, Ole, judge.

YOSEMITE PORTLAND CEMENT CORP., Merced, Calif.
Dunham, Roy.
Dutra, Earnest.
Flinders, Edgar.
Frie, O. C.
Linder, Alvin.
Pierce, S. C.
Tarpley, W. L.

The work of all of the teams in the four difficult problems assigned, was so well done that many experienced watchers were unable to distinguish between them. Between the events music was furnished by Payson's Coast Artillery Band. The committee of judges made their awards as follows:

FIRST PLACE: Cowell team. This award carried with it a prize of $20 to each member of the winning team and the first aid medals of the National Safety Council and American Red Cross for excellence in first-aid work.

SECOND PLACE: Team from the Redwood City plant of the Pacific Portland Cement Co. The prize consisted of a silver cup for superior first-aid work. Contributed by the northern California cement companies.

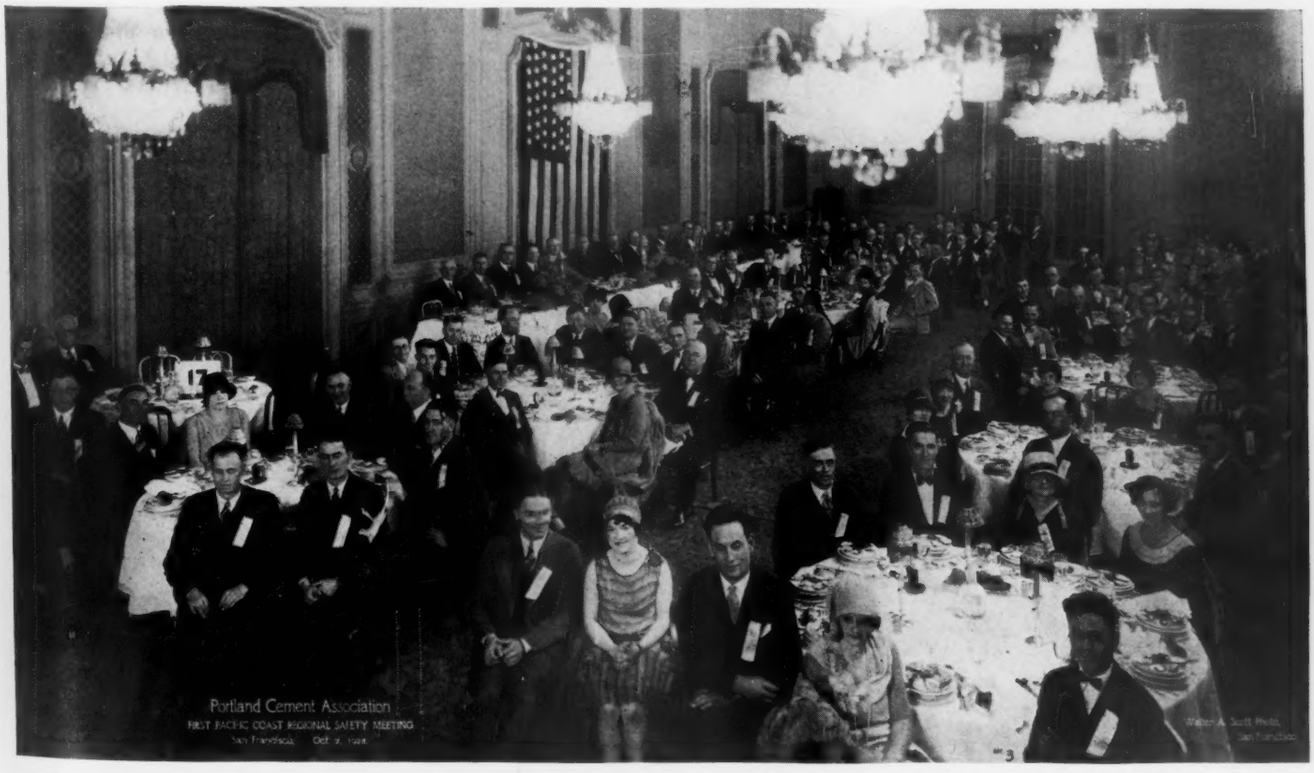
The remaining awards were made as follows: *THIRD,* Yosemite Portland Cement Corp.; *FOURTH,* Pacific Portland Cement Co., San Juan Bautista plant; *FIFTH,* Santa Cruz Portland Cement Co.; *SIXTH,* Superior Portland Cement, Inc.

Dinner Enjoyable

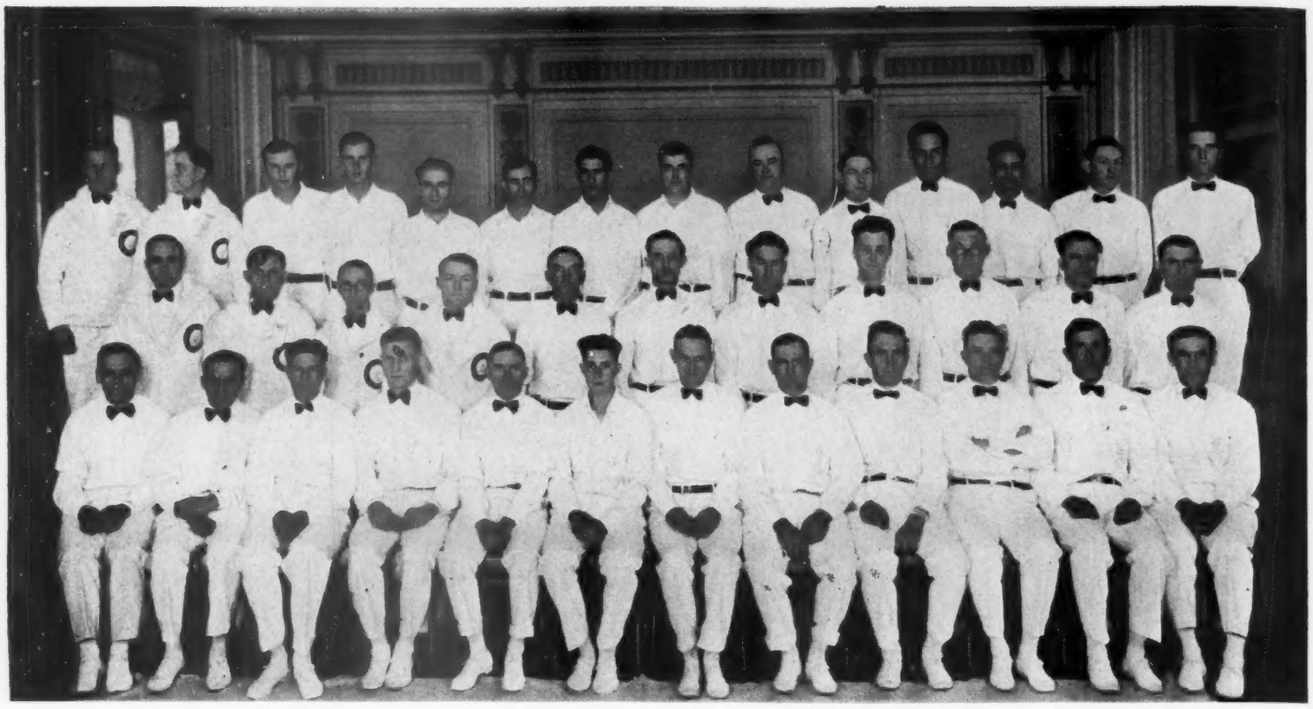
The dinner, held in the concert room of the Palace hotel that evening was one of the most enjoyable gatherings of cement officials and operating personnel ever held on the Pacific coast. An excellent musical program was provided and none of the items of well-known California hospitality were overlooked. The principal stakers of the evening were D. J. Parker, supervising engineer, U. S. Bureau of Mines; Will J. French, director of industrial relations, state of California, and Rev. W. K. Guthrie, D.D., pastor of the First Presbyterian church of San Francisco.

Will J. French

Mr. Parker, in describing the co-operative work of his bureau with the mine and quarry



Dinner held in concert room of Palace hotel by officers and operating personnel of the Pacific coast safety meeting of the Portland Cement Association



First aid team of the Cowell Portland Cement Co., winners of the first prize at San Francisco meeting

operators of the United States, stated that the work of the government men at cement plants was doubly pleasant and effective because of the eagerness of cement men to obtain help on their safety problems. Mr. French, who has been connected with the state department of industrial relations in an executive capacity since 1911, warmly applauded the work of the cement mills and stated that no industry had ever co-operated more heartily with the state officials and public agencies for accident prevention than had the California cement mills.

Coast Mills Making Fine Record

The comparative statement of accidents in Pacific Coast cement plants for corresponding periods of 1927 and 1928, which was presented and discussed at the morning session, proved a pleasant surprise to most of the operating officials. During the first eight months of 1928 the 17 Pacific Coast plants suffered 106 lost time accidents, a reduction of 50% from the record of 210 similar accidents suffered by 16 mills operating during eight months of 1927. During this period in 1928 the 150 mills in the entire association membership had 705 accidents, as against 931 accidents by 136 mills operating in 1927, a decrease of 25%.

While the mills of Oregon and Washington show fewer accidents per mill than others on the Pacific Coast, those of northern California have shown the greatest improvement in the entire association membership for this period. The record was as follows:

Northern California:
8 months of 1928, 6 mills, 25 accidents.
8 months of 1927, 5 mills, 78 accidents.
(Reduction 68%)

Southern California:
8 months of 1928, 4 mills, 47 accidents.
8 months of 1927, 4 mills, 93 accidents.
(Reduction 50%)

Oregon and Washington:
8 months of 1928, 7 mills, 34 accidents.
8 months of 1927, 7 mills, 39 accidents.
(Reduction 13%)

W. H. George

Whereas only one of the Pacific Coast mills operated during the first eight months of 1927 without lost time accident, five mills of this group operated eight months of 1928 without similar mishap and four mills are still in the race for the association trophy, with perfect records of from one to over two years.

As a result of the success of the meeting, the delegates went on record as favoring another conference of the same kind in 1929. The registration was as follows:

Registration

Calaveras Cement Co., San Andreas, Calif.

Buck, W. L., master mechanic.
Cleary, W. P., shift foreman.
Fisher, H., pack-house foreman.
Garbarini, R. M., assistant chief electrician.
Garbarini, Mrs. R. M.
Halley, E. E., chief clerk.
Hengen, C., shift foreman.
Henry, H. A., superintendent.
Lockwood, S. I., quarry foreman.
Maginn, H. C., sales manager (San Francisco).
Neal, B. E., boilermaker.
Newman, Gus, crusher man.
Rankin, W. D., general foreman.
Townsend, R. H., assistant superintendent.
Wall, Charles H., kiln burner.
Worden, O., crusher man.

Cowell Portland Cement Co., Cowell, Calif.

Avila, Tony, machinist.
Barnett, E. D., superintendent.
Barnett, Mrs. E. D.
Brandenburg, H. R., chief chemist.
Brandenburg, Mrs. H. R.
Brandenburg, Miss Zelma
Brann, Mrs. L. G.
Dermody, W. J., machine shop and roundhouse foreman.
Dermody, Mrs. W. J.
Dermody, Miss Gabriel
Frank, Russell, head sample man.
Levake, John C., quarry superintendent.
Levake, Mrs. John C.
Price, J. H., machinist.
Quinlan, Miss Margaret
Rader, Mrs. H., nurse.
Ryerson, Charles, machinist.
Ryerson, Mrs. Charles
Salazar, A., oiler.
Salazar, Miss
Smith, B. C., chief clerk.
Smith, Mrs. B. C.

Sullivan, W. E., foreman, packing house.
Sullivan, Mrs. W. E.
Sullivan, Mrs. Adelaide
Todd, Dr. E. B., doctor.
Todd, Mrs. Dr. E. B.
Walker, E. J., electrician.
Walker, Mrs. E. J.
George, W. H., secretary and general manager (San Francisco).
George, Mrs. W. H.
Bresee, M. H.
Landi, E. J.
Scott, George H.

Oregon Portland Cement Co., Lime, Ore.

McClenahen, J. M., superintendent.
McClenahen, Mrs. J. M.

Oregon Portland Cement Co., Oswego, Ore.

Shipley, H. R., superintendent.
Shipley, Mrs. H. R.

Pacific Portland Cement Co., Redwood City, Calif.

Bray, Phil, truck driver.
Bray, Mrs. Phil
Clattenburg, Dr., doctor.
Hall, K. C., machinist.
Haruff, H., general mill foreman.
Hewitson, J., sheet metal helper.
Hunt, J., sheet metal worker.
Hunt, Mrs. J.
Johnsson, M. J., superintendent.
Lang, A. G., chief engineer.
Macy, Wm., carpenter foreman.
Morris, R. F., chief electrician.
Norton, B., machinist helper.
Norton, Mrs. B.
Ray, R., machinist helper.
Roszell, Glenn, safety inspector.
Ryder, T., belt man.
Ryder, Mrs. T.
Stephens, Harry, shop foreman.
Talkington, pipe fitter.
Talkington, Mrs. J.
Colton, J. H., vice-president (San Francisco).
Herrod, R. F., purchasing agent (San Francisco).
Hoffman, C. P., assistant to vice-president (San Francisco).

Pacific Portland Cement Co., San Juan, Calif.

Bond, Joe, packing house.
Carter, Shreve, welder.
Dreisbach, Kenneth, engineer.
Durrin, Vernon, electrician.
Kurtyak, Andy, quarry.
Matus, John, quarry.
Norton, John, machinist.
Parker, F. F., superintendent.

Riverside Portland Cement Co., Riverside, Calif.

Bilderback, A. S., safety engineer.

Santa Cruz Portland Cement Co., Davenport, Calif.

Brownfield, A. T., electrician.
Huntsman, Al., pit foreman.
Huntsman, Mrs. Al.
Kinzie, R. A., consulting engineer.
Languth, Frank, chief engineer.
Rapp, F. A., experimental man.
Riordan, Joseph, assistant superintendent.
Riordan, Mrs. Joseph
Scofield, E. G., foreman, machine shop.
Scofield, Mrs. E. C.
Sorts, J. D., truck driver.
Sorts, Mrs. J. D.
Tally, F. L., welder.
Whitesell, E. V., repairman.
Williams, T. P., bookkeeper.
Williams, Mrs. T. P.
Gay, George R., general manager (San Francisco).
Jones, Paul C., district sales manager.

Southwestern Portland Cement Co., Victorville, Calif.

Anthony, P., chairman of safety committee.
Sargeant, H., secretary of safety committee.

Superior Portland Cement, Inc., Concrete, Wash.

Ambler, H. A., superintendent.
Baker, Fred, quarry.
Buchanan, E. M., chief chemist.
Jungblom, W. F., packing house.
Lang, Ernest, construction.
Lang, Robert, quarry.
McClellan, A. K., electrical.
Nelson, Ole, welder.

Yosemite Portland Cement Co., Merced, Calif.

DeJonckheere, A. P., superintendent.
Dunham, Roy, mill operator.
Dutra, Ernest, sample man.
Flinders, Edgar, timekeeper.
Frie, O. C., mix chemist.
Pierce, S. C., assistant chief chemist.
Linden, A.
Tarpley, W. L., mill foreman.
Wishon, A. Emory, president.
Fisher, G. A., general manager (San Francisco).

Miscellaneous

Blum, John R., gas distribution department, Pacific Gas and Electric Co. (San Francisco).
Bull, Al, E. D. Bullard Co. (San Francisco).
Cadman, C. K., Federal Mutual Liability Insurance Co. (San Francisco).
Cannon, T. D., assistant mining engineer, U. S. Bureau of Mines, Berkeley, Calif.
Chowen, W. A., manager, California Inspection Rating Bureau (San Francisco).
Curtis, A. J. R., assistant to general manager, Portland Cement Association, Chicago, Ill.
Davis, E. M., Gladding, McBean & Co. (San Francisco).
Foster, A. E., Hercules Powder Co. (San Francisco).
Foster, Alexander, Long Beach Lime and Putty, Long Beach, Calif.
French, Will J., chairman, Department of Industrial Relations (San Francisco).
Fry, C. H., superintendent of safety, Division of Industrial Accidents and Safety (San Francisco).
Gaskill, H. D., Hercules Powder Co., (San Francisco).
Guthrie, Reverend W. K., First Presbyterian Church (San Francisco).
Jellick, J. E., assistant general manager, Pacific Coast (San Francisco).
Levy, Leon G., Gladding, McBean & Co. (San Francisco).
Odgers, Joe, *Daily Pacific Builder* (San Francisco).
Parker, D. J., supervising engineer, United States Bureau of Mines, Berkeley, Calif.
Pickard, B. P., Marine Service Bureau (San Francisco).
Smith, A. B., sales engineer, Bent Concrete Pipe Co. (San Francisco).
Staples, Earle I., Staples and Pfeiffer (San Francisco).
Young, George J., *Mining and Engineering Journal* (San Francisco).

Rock Products Comprise a Constantly Larger Share of California's Wealth

COMPILATION of the final returns from the mineral producers of California for 1927 by the statistical section of the state division of mines and mining, under the direction of Walter W. Bradley, state mineralogist, shows the total value of the year to have been $366,659,594, being a decrease of $83,671,262 under the 1926 total of $450,330,856. There were 57 different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all of the 58 counties of the state contributed.

As revealed by the data following, the salient features of 1927 compared with the preceding year were: A large drop in the value of petroleum in an amount greater than the net decrease in the grand total for all substances, being only partly offset by increases in other items. Material advances were made by borates, cement, potash, natural gas, granite, limestone, quicksilver sandstone and soda. Decreases were registered by copper, zinc, miscellaneous stone, brick, lead, salt and silver. There were a number of other minor variations, the result being a decrease in the totals of the fuels and metal groups, while all other groups showed increases.

Of the structural group: Cement advanced from 13,797,173 bbl., valued at $25,269,678, to 14,661,783 bbl. at $26,474,935, though the average price per barrel dropped from $1.84 to $1.80; granite increased in value from $655,332 to $1,398,443, and sandstone from $17,500 to $205,400; brick and hollow building tile dropped from a valuation of $7,026,124 to $6,516,077, and miscellaneous stone from $19,859,873 to $18,911,194; of the remaining minerals in this group there were no material changes. Of the industrial minerals here were a number of fluctuations, with a general trend of increasing production and value.

Construction Volume in 1928 Will Probably Make a New Record

PAYING NO ATTENTION to the idea that industrial operations should slacken during a "presidential election year," construction work is moving at a pace that will advance its total value for 1928 to approximately $8,000,000,000. This is the conclusion reached in a report presented to more than 100 construction leaders from all parts of the United States at a conference here this week under the auspices of the Associated General Contractors of America.

Based upon a survey of the first nine months of this year and the prospects for weeks of the immediate future, the report states "it is virtually certain that the volume of all types of construction operations handled during 1928 will equal if not exceed the record-breaking total registered for last year."

"Except in the cases of a few cities having a surplus of apartment houses, an over-built condition does not exist," the report continues. "In most communities, vast numbers of structures now are becoming obsolete, not only because of age but because of demands made by the increasingly high American standard of living."

A marked decrease in the amount of "speculative buildings" of small homes which marked the records of two or three years ago is noted. Whatever slackening might have resulted from this decrease has been offset, however, by the increase in volume of public works operations.

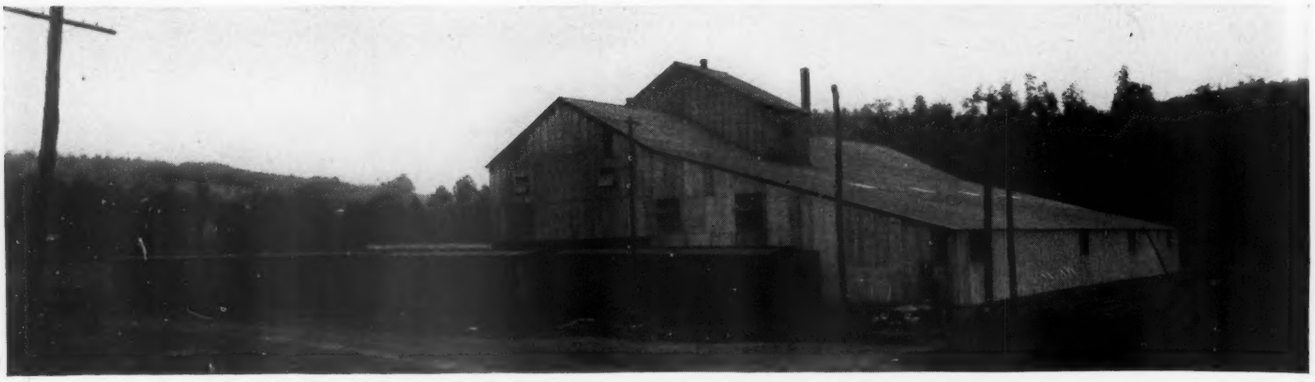
Missouri Crushed-Stone Quarry May Operate All Winter

THE Bethany, Mo., quarry of the Concrete Materials Corp., Waterloo, Iowa, may continue to operate all winter if the contractors can get permission to store the rock, according to D. R. Keedwell, superintendent.

Since discontinuing the night shift the quarry has been producing about 42 carloads of rock a week. Mr. Keedwell said that he would keep on working this way, as it was proving satisfactory. If there is sufficient output for the rock this winter, the plant will continue to operate as long as the weather permits. He said with the exception of a few days that they could work all winter, if contractors could get permission to store the rock until spring.

The quarry is selling a lot of the screenings to farmers. Although these are a little coarse for immediate results, Mr. Keedwell says that they will last from five to six years and give good results.

Recently the quarry has been enlarged and will continue to be enlarged. The quarry is as deep now as the operators expect to go, as the rock underneath is not of high enough quality to pass the requirements set forth by the state highway authorities for paving. —*Bethany* (Mo.) *Clipper.*



General view of the shipping side of the new milling plant of the Blue Ridge Talc Co.

Blue Ridge Talc Company's New Mortar Pigment Plant

Latest Developments Applied to Production of Reds, Buffs, Blacks and Chocolates

By C. O. Kitson

Secretary and Treasurer, Blue Ridge Talc Co., Henry, Va.

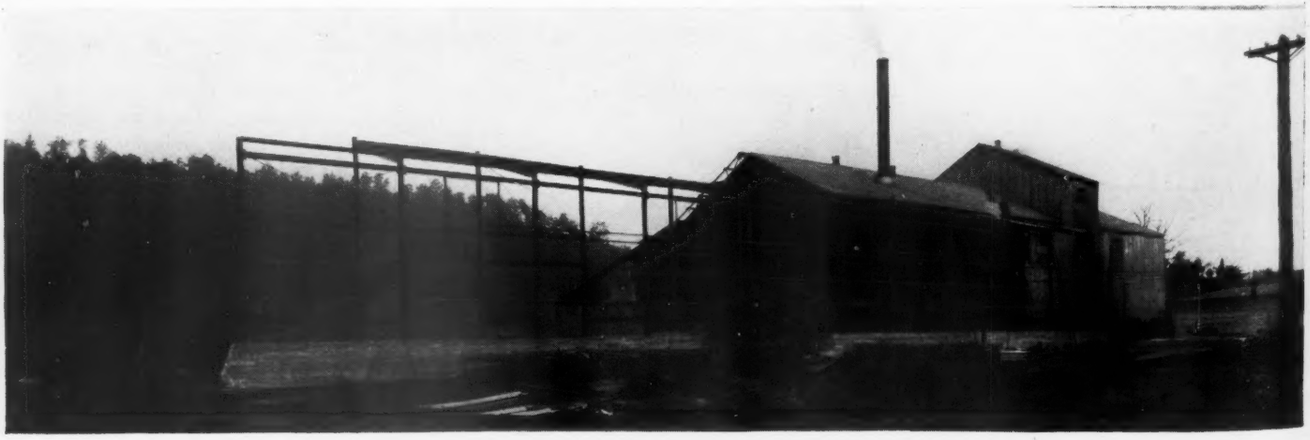
THE PIGMENTS PLANT of the Blue Ridge Talc Co., Inc., of Henry, Va., consists of a main grinding building, finished warehouse, raw material storage, shop and storeroom and office building. The office building is two story, 24x24 ft., dark mingled shade brick laid up in buff mortar color of our own manufacture. This building also houses the laboratory where tests for fineness, shade, tone and strength are made of the company's products. The shop and storeroom is a steel clad and covered building, 16x60 ft. Stocks of supplies are kept and a small shop equipped with electrically driven tools is housed in this building.

The raw material storage is a steel structure, sheet steel covered, 42 ft. wide, 96 ft. long with two 36-in. gage railway tracks, one on the floor, the other elevated 12 ft. to permit the dumping from 2-yd. Koppel quarry cars of material from quarries. An overhead tramway is operated to transport raw materials over a suspended Howe scale.

The main grinding room houses the heart of the plant and is 42x128 ft., 24 and 35 ft. high, a steel structure with sheet steel covered roof and sides. Primary crushing of ores is accomplished by means of a Jeffrey hammer mill, which reduces the material quickly to ½-in. size. By means of a Sturtevant all-steel bucket elevator the crushed ores are delivered to a Fuller-Lehigh 36-in. by 30-ft. rotary dryer by which through indirect heat all excess moisture is removed from the ores. Another all-steel bucket elevator delivers the dried ores to a steel, pulverizer, service bin.

Pulverizing Plant

Pulverizing is done with 4-roller Raymond mill, the mill and exhaust fan both having Allis-Chalmers texrope drives. Pulverizing reduces to a fineness of 325-mesh. Tests show the product has 98% or more passing through a bronze screen having 325 wires each way, or 105,625 openings, per square inch. This screen is so fine it will float on water. Pulverized material is removed from the mill by a vacuum fan driven by a 40-h.p. motor. Delivery is made into either the bagger bin or a blending bin. Certain color



Raw material storage under construction

shades are the result of blending two or more colors, as, for instance, chocolate is produced by blending together of black and red. Shades requiring blending are delivered into a 25-ton steel bin, under the discharge of which is constructed a one-ton weigh hopper of special design suspended from Standard Scale Co. scales.

Blending Colors—Packing

The blending or mixing is done in a 4000-lb. 36-in. by 12-ft. Salem mixer, which in turn discharges into another all-steel bucket elevator, delivering into the bagger bin. Finished material is bagged in 50-, 75- and 100-lb. paper bags, paper-lined and plain jute bags. Some products are also packed in wood barrels, steel drums and cans. Soapstone is bagged in a Bates two-tube bagger.

The finished material warehouse is 52x128 ft., of structural steel with steel roof and sides. This building, like all others, has concrete floor. All bagged material is stored, 10 bags deep, or ½-ton in each pile of 100-lb. bags. Barrels are stored on steel barrel storage racks, built by the Revolvator Co., 2 wide, 4 high, 10 deep, each rack holding 80 bbl. Racks are filled with an Economy Engineering Co. lifter. About 20 carloads of finished material can be stored in this warehouse. A concrete loading platform serves the length of three freight cars.

Shipments to All Parts of the World

The Blue Ridge Talc Co., Inc., is the largest producer of mineral colors in the state of Viriginia and one of but six such establishments in the South. Products of this plant, which include soapstone, cement, stucco and mortar colors, ochres, mineral blacks and foundry facing, are shipped to all parts of the United States and Canada, including the Pacific coast; also the Hawaii, Japan, Cuba and England.

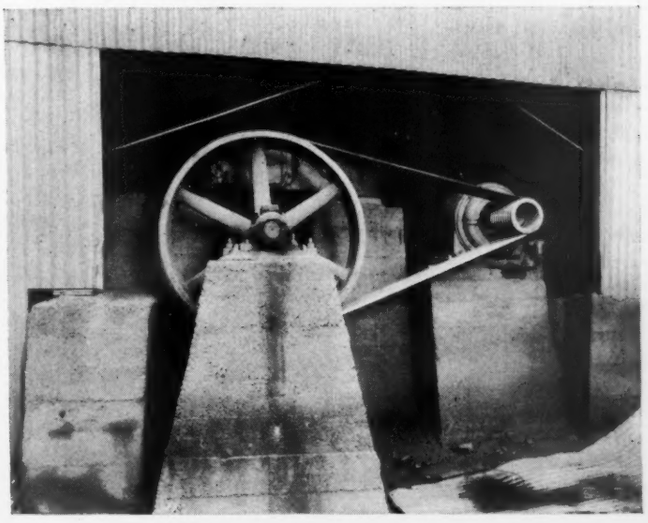
Crude ores for operation are shipped in from the Lake Superior region, Alabama, Texas, Louisiana, West Virginia, Tennessee and Georgia to supplement the company's quarry operation at Henry, where soapstone is taken from an open cut having an 80-ft. face. This soapstone is transported to the plant site, some 2500 ft. distant, by a 36-in. gage tramway, gasoline power being used to operate 2-yd. Koppel, steel, rocker, dump cars.

The present plant is all-steel and concrete construction, with individually motor-driven machines, and has recently been completed following a fire February 1, 1928, which completely destroyed the old plant.

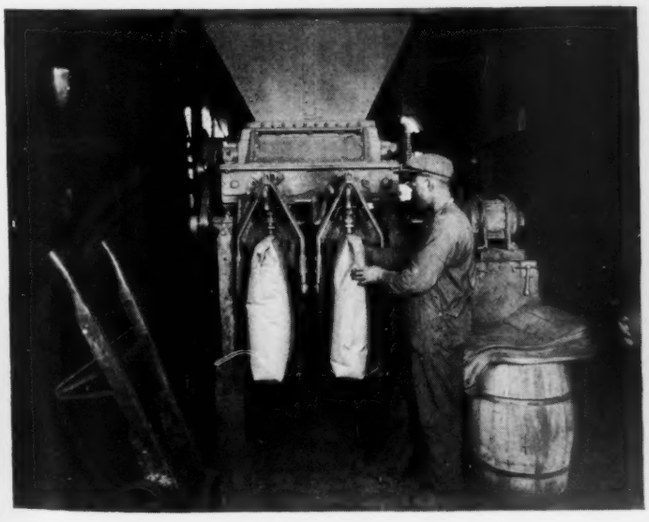
Motors were supplied and installed by the Charlotte Electric Co.; all 100-h.p. and under have push-button remote-control.

The plans and engineering work was done by the company's secretary, the author.

All customers' orders were filled during the period of suspension caused by the fire, from February 1 to May 10. Surplus equipment of a plant in a neighboring town was placed in condition and 10 days after the fire orders were being shipped. Some material was also purchased from competitors whose voluntary offers of assistance were much appreciated by the officials of the company.



Motor and drive on pulverizer



Bagging mortar colors

Idaho Sand and Gravel Producer Has Odd Sideline

AN EXCAVATION, 100 by 100 ft.; that is to be the basement for a new warehouse that the Palace Sand and Gravel Co. expects to complete on the company's yards on Eighth street south, Twin Falls, Idaho, is being converted this fall into one of the most convenient and best equipped potato cellars in this territory, with a capacity of 60 carloads. Floor joists and a first floor over the excavation have been covered with earth and straw.

By means of a conveyor it will be possible to load potatoes from the cellar directly into cars on the spur track in the company's yard.—*Twin Falls* (Ida.) *News.*

It pays to advertise

Canada to Keep Tariff on Portland Cement—Temporarily at Least

Tariff Board Meeting Adjourned Without Definite Action on Farmers' Application

(By Rock Products' Montreal Correspondent)

THE CANADIAN COUNCIL OF AGRICULTURE wants cement put on the free list because it claims the industry does not need the protection of a tariff and is prosperous without it.

The cement companies, on the other hand, submit that the tariff is only 8 c. a hundred, that cement is cheaper now than it was before any merger of cement companies took place, and the sale price is less than it would be if cement were imported.

The case came before the tariff board at Ottawa recently.

A. E. Darby, appearing for the council in support of the application, said he represented 35,000 farmers as well as the United Grain Growers. He was supplemented by R. J. Deachman, of the Consumer's League. E. G. Long appeared for the Canada Cement Co.; Strachan Johnson, for the St. Mary's Cement Co., and Prof. Jackson for the cement producers generally.

The brief of the Council of Agriculture set forth a number of general arguments on tariffs and the operation of duties. It was submitted that "cement prices tend to be raised by the duty on imports, the consumers of cement paying both the duty when imposed and a correspondingly increased price on Canadian produced cement. It was claimed that farmers and most other consumers receive and can receive no compensating protection for what they have to sell, and that agricultural industry is hindered by the duty in proportion to the relative importance of cement as an article of commerce.

Chairman Moore remarked that all farmers were evidently not for tariff lowering, judging by their application to the board, and Mr. Darby admitted that "we have our differences," but considered he spoke for the greater number of farmers. He went on to argue that import duties, or "monopolistic practices," operate to increase the costs of production in agriculture and industry, while manufacturers could raise their prices in proportion to the tariff.

Attacks Canadian Cement Merger

From this the applicant counsel went on to discuss the Canada Cement Co., made up of 14 companies, purchased in cash or stock for $14,822,250 and then united with stocks and bonds of $29,000,000, valuing the properties at $27,134,786. Many other details of the company's financial structure were given along with its earnings. He calculated the total value of the company's bonds and stock to be $56,000,000. Net earnings to the end of 1928 were figured at $47,943,485.

Mr. Long, for the company, claimed that the figures submitted were not properly net earnings, and he gave a list of contrary figures.

Dr. Darby said his figures came from a circular of Wood Gundy and Co. "Mr. Gundy," he added, "makes one statement when selling these securities and now differs from them."

Mr. Long stated that the figures of earnings on cement harmonized but the company's collateral earnings outside of cement altogether, should properly be segregated.

The rest of the brief of the council dealt with cement prices, claiming wide disparities, in different places in the west. The average price in Quebec was placed at $1.16; in Ontario, $1.37; in Manitoba, $2.49, and British Columbia, $2.25.

The general argument was that under the tariff the cement companies have "acquired a position of virtual immunity from the operation of economic influences."

Removal of the duty, it was argued, would correspondingly cheapen the price of cement.

There was some discussion as to whether the collateral earnings were from cement or from other things.

Much Profit from Sidelines

Mr. Long finally agreed that the subsidiary operations were carried on from the credit secured through the Canada Cement Co.

Frank P. Jones intervened to say that the cement company has various lines of business, including munitions. The money for the latter has been secured on the credit of the cement company.

Much money had been made, but it was not paid out; rather, it was invested, he said.

"I, personally, am proud of our record in munitions," said Mr. Jones.

"It was made by selling munitions to the British government at prices cheaper than anyone else quoted. The government saved $30,000,000 because of our prices. We fear no charge of profiteering."

Mr. Jones further stated that the company had made $70,000 on exchange in New York transactions. He insisted that the earnings in question were quite apart from the cement business proper.

The reply of the Canada Cement Co. pointed out that cement now sells in Canada less than it did before the merger, the prices representing an average total profit per barrel of only 21 cents or about 6½% on the capital employed. Since 1909 the duties had been reduced by 60% while a study of certain handicaps, principally duties on materials, reveals that these offset the remaining protection to the extent of more than 18 cents per barrel. The actual, net protection was less than 10 cents per barrel.

Prices Generally Lower Than Imported Cement Could Be Sold For

The cement companies proceeded to combat as incorrect the argument that cement prices are based on the tariff while certain districts near the border might be able, through the tariff removal, to buy American cement a few cents cheaper. This benefit would be offset by an added burden on other districts cut off from American sources by freight costs. A table was filed enumerating 723 places in western Canada and prevailing prices for cement. In 640 of these Canadian cement is now selling at lower prices than could be charged for American cement even if the latter came in free. The average price was 54 cents per barrel below the United States cement, plus duty, and therefore 26 cents less than the price at which American cement could come in duty free.

It was admitted, however, that in 81 places out of 723 in the West, all but one in Manitoba, United States cement could be purchased at an average of 5½ cents below the price now paid. The cement producers also asserted that prices have not been inflated by restriction of output while the trend of cement prices compare with that of wholesale prices from 1909. The former were always relatively lower and figures to establish this were quoted.

From the peak in 1921 the price of cement had sagged continuously despite the tariff reduction from 12½ cents to 8 cents per hundred, moreover, the rates are specific and every variation in the world price involves an alteration in ad valorem duty and in the degree of protection.

Removal of Duty Would Increase Prices

"Removal of the duties on cement would not only cost the producers a considerable part of their home market, but, by restricting their production, it would increase the cost of production per barrel in their mills, on that part of the product which could still be sold in the home market. If it did not put them out of business—and this would be the logical result in the case of at least one company—it would have unfortunate consequences in two directions. In the first place, it would not longer be possible to secure an adequate return on the capital invested in these companies. In the second place, throughout the greater part of the Canadian market, which is not in any case accessible to cement producers abroad because of the heavy freight charge involved, it would, by raising mill costs of production, result in an increase of prices to the consumer."

This final argument was given to the Tariff Board at Ottawa, by Prof. Gilbert

Jackson, of the University of Toronto, in opposing, for the cement companies, the application of A. E. Darby, for the Canadian Council of Agriculture, for the removal of the duty of 8 cents per 100 lb. on cement. At the conclusion of Prof. Jackson's reading of his elaborate and effective brief, Edwin Tomlin, of the British Columbia Cement Co., one of the smaller companies, added his protest against the application for removal of the duty. Following his statement the cement hearing was adjourned to a date to be fixed later.

Establishing the reasonableness of cement prices in Canada, Prof. Jackson declared that, whereas wholesale prices generally seem to have been stabilized at a point nearly 70% higher than those of a generation ago, the price of cement was actually lower in 1927 than in the years 1904-08, which are treated as a basis for comparison; that compared with goods in general, cement has been cheapened by no less than 41% during the same interval of time; and that, compared with more than 50 points in the United States, Canadian cement prices are generally lower.

Reasonableness of Profits on Cement

Turning to the question of the reasonableness of profit, Prof. Jackson had this to say:

"Experience has demonstrated that, to establish at the present level of mill construction cost in the cement industry, an efficient cement mill of 900,000 bbl. annual capacity, for example, an investment in plant and working capital amounting to about $3,600,000 would be necessary. The cement producers are prepared to submit evidence in support of this figure.

"A well constructed mill, built before the war-time increase in construction costs, may represent a smaller investment originally. In such a case the plant has appreciated, as most commodities have appreciated since 1913, owing to the working of economic forces not yet under control. Even in such a plant, however, the rate of depreciation is rapid, and replacements must be made on the basis of current construction cost. Thus within a comparatively short period even such a mill must represent an actual investment not differing greatly from the figure named above.

"This sum may be represented, in particular plants, by common stock or a combination of common and preferred stock, or a combination of common and preferred stock and bonds.

"For the last three years the combined figures under the headings of 'Interest and Funded Debt' and 'Profit,' have been as follows:

"1925—23.47% of the sales dollar.
"1926—17.62% of the sales dollar.
"1927—17.68% of the sales dollar.

"At the prices per barrel then ruling, the actual amount available as interest on these securities was: 1925—42.7 cents per barrel; 1926—28.0 cents per barrel; 1927—26.5 cents per barrel.

"It is the reasonableness or otherwise of these earnings, which is under discussion. They represent interest earnings at the rate of: 1926—10.7%; 1926—7.0%; 1927—6.6%.

"We would remind the board that though they may thus be represented in the form of rates of interest, by no means the whole of these earnings can be paid out to bond- and stockholders. Referring to what has already been said, they must provide for necessary mill extensions in a rapidly growing market, and for possible losses in a time of business depression.

Present Earnings 6.6% Defended

"We submit that earnings at the rate of 6.6% on actual value of plant and working capital are not to be regarded as a source of unreasonable profit. Indeed we would go further and state that, in view of the sudden changes of fortune to which industrial undertakings of all kinds are unfortunately subject as a result of the unforseen changes in business conditions, average earnings of only 6.6% are scarcely to be regarded as giving the necessary margin of safety to the producers, or to the public which provides the capital required.

"On all of these grounds, because in a period of years cement has steadily been cheapened in relation to goods in general, because when Canadian and United States prices of cement are compared, the comparison, on the whole, is favorable to the Dominion, and because earnings on the investment represented by the plant and working capital of the companies have declined, to stand at present at a very moderate figure, we contend that there is no justification for regarding as unreasonable the price of cement in this country."

Pointing to the handicaps under which his company operated in British Columbia, Mr. Tomlin, of the British Columbia Cement Co., first referred to the operation of the 8-hour-day law, peculiar to British Columbia among all the provinces of the Dominion; to the operation of the minimum wage law, peculiar also to British Columbia, as far as male labor is concerned; to the relatively poor quality of the coal they have to purchase for their mill purposes, and to the fact that British Columbia citizens pay the highest taxes of any province in the Dominion. He stated that the provincial and federal governments, for instance, collected 18.1% income tax from British Columbia business concerns. He concluded by declaring that removal or reduction of the present duty on cement would have disastrous consequences upon their company.

Supporting Mr. Tomlin's position was a letter from the Mining Association of British Columbia and a petition from 100 employees of the British Columbia Cement Co., both of which communications were read by H. B. McKinnon, secretary of the board, at the request of its chairman, W. H. Moore.

Following completion of the producers' case, the hearing was adjourned to meet at the discretion of the board. As considerable new data relating to the application have been requested by the spokesman of the Canadian Council of Agriculture, it was intimated that the next sitting would not be held before the first week in November.

Midwest Rock Products Business Brisk

INCREASES of 10% were forecast for the shipment of cement, clay, gravel, sand and stone by the Midwest Shippers' Advisory Board, meeting at Springfield, Ill., October 10. The volume of business activity in midwest territory as a whole in the last three months of this year will be approximately 7% greater than in the same months a year ago.

Monolith Portland Gulf Company Is Name of South Texas Project

FIRST LOCAL EVIDENCE of active construction on the proposed $2,500,000 cement plant of the Monolith Portland Gulf Co. on Harbor Island, near Corpus Christi, was presented recently when the tug *Terrel*, drawing a derrick barge, passed under the bascule bridge for the Harbor Island section. The barge was loaded with pipe which, it was said, would be used in dredging for the Monolith company.

It is understood that the dredging of a slip 600 ft. long and 300 ft. wide on Burnett terminal will start immediately on approval of the project by L. A. Gerringer of the state railroad commission.

At this plant it is proposed to manufacture plastic, waterproof cement. Present plans call for the making of this product out of mud shell and native clay deposits.

The plant is to be situated upon land secured from the state. The state issues permits for construction on Harbor Island only in consideration of very early industrial development. The site for the factory was arranged for through Coy Burnett, president of the Monolith Portland Cement Co., of California, and by Judge Frederick C. Robertson, who represents Mr. Burnett and associates at Port Arkansas. An advance statement declares 400 men will be employed.

Construction on the plant has been delayed for many months following first announcement of the original plan to build. This delay has been occasioned, it is said, by the construction of another project in Wyoming.

The Monolith interests are reported to have paid the state $9,000 to date for shell under a contract with which the concern has entered into with the state of Texas. They have also obligated themselves to make regular payments at specified intervals in order to retain the privilege of using the deposits. —*Corpus Christi* (Tex.) *Caller.*

Foreign Abstracts and Patent Review

Manufacture of Wood-Concrete. The German Patent No. 456,798 of the firm J. F. Rohr in Pfaeffikon near Zuerich, Switzerland, protects a process for the manufacture of an artificial hardwood consistent in volume and made of vegetable fibers, trass, etc., with cement as binder, reinforced with impregnated textile fibers. The mass is compressed into forms under high pressure and made into plates. It is supposed to harden to a degree where the plates can be cut only with metal saws. Plates manufactured thus were placed for five days in cold water and then in water heated to 392 deg. F. without incurring damage. In manufacturing them, about 14 parts of impregnated sawdust, 10 parts of portland cement and 8 parts of trass, asbestos flour or talcum, by volume, are first mixed in dry condition. The mixture is moistened with a ferric salt solution of 3% calcium chloride and 10% ferric chloride and then pressed; the calcium chloride increases the binding ability of the sawdust with the cement, and the ferric chloride increases the strength of the mass and gives it a color simulating oak wood. Then a net of textile fibers having been boiled in a concentrated solution of ferric chloride, alum or calcium chloride is laid in mortar to cover the plates. The completed plates may then be placed in mortar or asphalt upon concrete or wood floors. German Patent No. 390,433 of Paul Anft, Thal-Itter, Bezirk Kassel, protects a process for the manufacture of wood-concrete in which the sawdust and wood shavings are treated with potassium nitrate and milk of lime, and a part of it with potassium carbonate. The shavings, also having been soaked for a certain period, are first dried before they can be worked into seamless floors or into plates, after being moistened with portland cement mixed in the proportion of 1:5 with water. Blast furnace cement or slag cement is unsuitable for this purpose. A more stone-like product is said to be obtained by the addition of mineral fillers, such as powdered stone, sand of various kinds, steatite and especially also flying ashes from brown coal; and a product simulating wood by adding powdered cork and coarser ground cork, peat, asbestos or similar material. A tested mixture is made as follows, according to the patent: Two-thirds of wood shavings or sawdust to be used is soaked for 24 hours in milk of lime mixed with 2 grams of potassium nitrate per liter and then dried well; in order to make the product waterproof a bitumen of the nature of Ceresit, Heimadol, Arzet, etc., is added to the make-up water, or the completed product may be painted twice with one of these waterproofing materials. About 48 to 72 hours after production a slight grinding of the plates or of a floor of this material with a fine sandstone or emery stone is said to be possible. When pressing the product, the material should be worked only in a damp condition. The pressed and formed plates may be shoved from the form box without the shavings being changed from the shape in which they are pressed or the texture of the plates being loosened.—*Baumarkt*, **16**, p. 549, 1928.

Methods for Determining Lime in the Raw Materials Used in the Production of Cement. One of the most important problems in the cement industry is the production of a homogenous raw mixture necessary in the manufacture of cement. In the preparation of the raw material, the main concern is the relation $\frac{CaO}{SiO_2 + R_2O_3}$, the so-called hydraulic index. The relation between SiO_2, Al_2O_3, Fe_2O_3 is ordinarily not regulated, and most cement works are satisfied with the composition of raw material offered by nature. But since it has been shown in countless tests that the chemically combined SiO_2 can be replaced with fine ground quartz (the quartz parts should pass through a 10,000-mesh, metric sieve (250-mesh) it is possible to add quartz flour to the raw materials before they enter the raw mill, in order to manufacture portland cement which is richer in silicic acid. In the presence of Fe_2O_3 such mixtures sinter easily. For the continuous control of the raw material, two methods are in customary use. One laboratory chemist conducts his investigations in titrating with normal hydrochloric acid and ½N caustic soda, the other works with the carbonic acid method in well-known apparatus such as those of Bauer-Cramer, Dietrich, Scheibler-Dietrich. Many cement works laboratories use the so-called standard test material, which is a mixture of raw materials of exactly determined standard composition with which the methods of analysis are checked occasionally to catch possible errors. Franz Kubik has conducted tests with such a standard mixture in parallel with the titrimetric and calcimetric methods in a cement works laboratory which extend over a period of five years. The test samples were dried for half an hour before each test and permitted to cool. The results of 17 tests were as follows: In the titrimetric method the minimum was 76.4%, the maximum 76.7% and the average 76.56%; and in the calcimetric method the minimum was 77.1%, the maximum 77.5% and the average 77.28%. The content of $CaCO_3$ found in the analysis was 76.11% and that of $MgCO_3$ 1.25%. According to the results, the average of 17 tests in each testing method exceeds the results of the analysis by 0.45% $CaCO_3$ in the titrimetric and 1.17% $CaCO_3$ in the calcimetric method. Outside of the fact that different methods lead to different results, the magnesia content plays an important part; it is in both cases generally included and given as $CaCO_3$. It has been assumed in the past that the hydrochloric acid necessary in titration for the dissolution of $MgCO_3$ is compensated for in titrating back, and that the red coloring does not start until all $MgCO_3$ is precipitated as $Mg(OH)_2$. This is, however, not the case, for no matter how difficult it may be to dissolve the $Mg(OH)_2$, the dissolution of a base of the Second Group is colored red by the phenolphtalein. The coloring starts before the precipitation of $Mg(OH)_2$, so that the magnesia is determined in part in titrating, if not all. How much $MgCO_3$ can be determined with it can be found best by titrating with analyzed dolomite. From the 17 parallel tests it is concluded that both methods are applicable, with the reservation that in the titrametric method the raw mixture must be held apparently at 76.56%, and in the calcimetric method at 77.28%, in order to approach the value 76.11% found in the chemical analysis. Each method can be used in the cement-plant laboratory, even if it does not offer absolute results. The main thing is that the error of the method remains always the same and is not exposed to excessive fluctuations. The chemists can use many exterior indications in order to determine the lime content of the raw mixture. Fluctuations of 0.5% in $CaCO_3$ in the kiln may be observed by the behavior of the material. A more difficult burning, small grains of clinker, etc., indicate too much lime in the raw mixture. A lower mixture results in deposits (ring formations). The appearance of the clinker differs also according to the $CaCO_3$ content in it. Normal clinker has a black-gray, greenish or bluish appearance with a certain opalescence, which originates from the many colorless crystals. A lower mixture gives slag-like dull pieces of clinker.—*Tonindustrie-Zeitung* (1928), **52**, 678.

Trass for Cement Products. The Trasswerke Meurin A.-G. Andernach a. Rhein, recommends a mixing proportion of 80 weight parts of portland cement and 25 weight parts of Nettetaler trass in place of 100% cement used alone to an inquiring reader. Thus, after 28 days, at least 100% of the strength of portland cement used alone can be secured. The strength of flexture of the roofing stone obtained with this formula exceeds that of the stone made with portland cement alone as the binding material. Similar results are obtained with a mixing proportion of 75 weight parts portland cement and 25 weight parts Nettetaler trass when using the Trassia pre-mixer. The use of trass makes the stone also more solid. The Nettetaler

trass has shown a compressive strength of 230 kg. and a tensile strength of 30 kg.—*Baumarkt,* **27,** p. 552, 1928.

Storage and Packing of Cement. E. C. Blanc describes the storage of the finished cement in bins and the equipment which is used in packing the cement. The automatically operating machines such as "Exilor," "Silator," "Bates" machines and keg packing machines are described in detail, and finally the dust removal plant is also dealt with, including suction hose filters, Pfeiffer cyclones, and the Cottrell and Oski processes of electrical precipitation and dust removal.—*Rev. du Beton Arme,* No. 105 (1928), p. 641; (*Zement,* No. 23 [1928], p. 910).

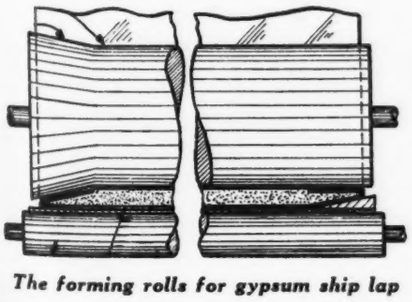
Importance of Magnesite for the Wood-Filled Tile Industry. The most important organic fillers for caustic magnesite are sawdust and ground wood, and the most important inorganic fillers are principally talcum, infusorial earth and asbestos, to which fillers, suitably colored, may be added to suit the wood-filled tile for flooring and other purposes.—*Baumarkt* (1928), 27, p. 905.

Modern Problems in the Cement Field. Dr. Eng. H. Luftschitz discusses the use of cements of the same kind, but made at different plants or stored in different bins, and also of different types of cement, separately or mixed, on the same building site, its possible effect, such as compensation of qualities, and the need for standards for portland cement, iron portland cement, blast furnace cement and lime in this respect, and he suggests that the three German associations should jointly test the three types of cement to determine the effects they give when mixed with each other or with various makes within each type, in order to secure a greater utility from the cement standards thus far in use by establishing rigid standards for the use of different makes and types of cements at construction sites.—*Tonindustrie-Zeitung* (1928), **52,** 57, pp. 1158-1160.

Recent Process Patents

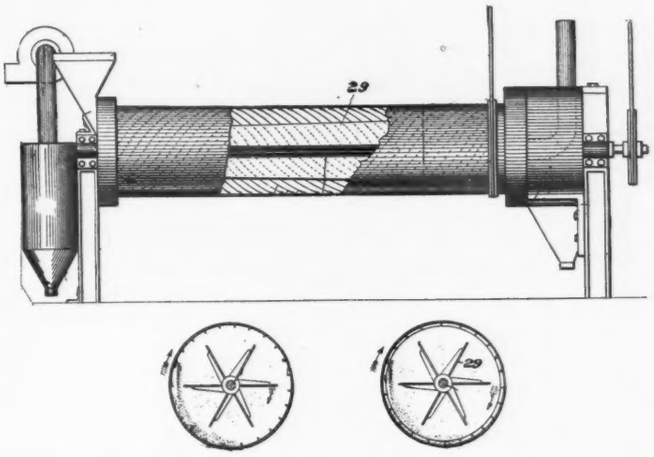
The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Apparatus for Making Lap-Edged Plaster Sheathing. The inventor claims a method and machine for forming, by a continuous process, means for manufacturing a paper-covered, plaster body, sheathing board.



The forming rolls for gypsum ship lap

The longitudinal edges are so formed as to lap over each other at the bottom. The two flat sides of the board to be covered with paper and folded at the edges to form various types of sheathing lumber.



Air classifier with internal fans for additional draught

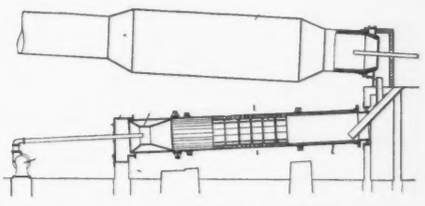
The plaster board so formed to be used in the construction of frame houses by nailing to the studding before the clap-board, stucco, pebble dash or finishing coat applied. Heretofore wood sheathing or ship lap has been used. The advantages claimed for this gypsum sheathing are that the walls are nearly fireproof, dampproof and not affected by atmospheric or temperature changes.

The machine used is similar in principle to that disclosed in the C. R. Birdsley Patent 1,383,255, of June 28, 1921. This machine for manufacturing sheathing comprises a method of advancing a cover sheet, with means of turning up the edges of the cover sheet and of depositing plastic material in the troughed paper thus formed, after which a second cover sheet is applied and pressed to form the desired shaped edge and to force the plaster to the outer edges of the paper laps. The patent covers modified means of making this sheathing by stationary and semi-continuous methods.—*Charles R. Birdsey, assignor to United States Gypsum Co., Patent No.* 1,676,318.

Some Novel Features in New Air Classifier. Air separators of this type are used to separate light particles from heavier ones by means of a current of air, the draught being sufficient to carry off the fines and leave the heavier materials. In carrying out his process, the inventor describes a nearly horizontal drum through which the ground ore is fed by suitable means. The interior of the drum is provided with numerous longitudinally extended ribs that serve to pick up the material and drop it by, rotation of the drum, through the air currents that pass through the cylinder in the opposite direction to the flow of ore.

The air currents are secured from two fans, one of which is located at the feed end of the drum and this, in addition, serves to carry the fines to suitable dust collectors. The novel feature of the whole apparatus is the second fan, which is constructed within the horizontal drum. This fan is constructed of a series of long, tapering blades fastened to a suitable spider and the whole is mounted on a nearly horizontal shaft running longitudinally through the separator. The shaft extends through the outer end of the drum and can be driven from there by suitable means. It is desirable to have a stronger current of air at the discharge end of the classifier, so the fan blades are constructed wider at that point. In the cut (29) shows the tapered fan within the classifier.—*Albert H. Stebbins, June* 19, 1928, No. 1,673,848.

Rotary Kiln for Sintering Minerals. A rotary kiln combined with a separate cooling drum located under the kiln or having a cooling portion connected to the burning drum as in a continuous tube. The outlet end of the cooling cylinder is constructed with an air-tight hood provided with draught regulators to control the amount of air passing through the cooling section. This air, after becoming heated from the hot clinker, passes to the kiln and is used to support combustion. The patent provides means of blowing additional air, by a fan, into the discharge end of the cooling chamber, if the natural draft is not sufficient for the needs of the kiln, and describes means of controling the amount of this air.



Cement kiln with cooling drum below

The cooling drum is provided with a series of baffle plates or dribble bodies, which receive and carry the hot clinker upward, where they are dropped by the rotation of the kiln. The baffle plates are also provided with consecutive shovel-like projections to further distribute the clinker.—*Fritz Luther, assignor to Y. Polysius Co. (Germany), June* 12, 1928, No. 1,673,051.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Sept. 8	Sept. 15	Sept. 8	Sept. 15
Eastern	3,602	4,064	16,963	19,541
Allegheny	3,878	4,536	9,561	11,957
Pocahontas	612	445	799	1,081
Southern	587	891	10,090	12,025
Northwestern	1,544	1,680	9,189	9,591
Central Western	600	611	11,276	11,953
Southwestern	376	431	7,318	7,627
Total	11,199	12,658	65,196	73,775

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

	Limestone Flux Period to Date		Sand, Gravel and Stone Period to Date	
	1927	1928	1927	1928
District	Sept. 17	Sept. 15	Sept. 17	Sept. 15
Eastern	126,056	107,330	383,894	382,487
Allegheny	130,712	123,318	300,861	262,150
Pocahontas	19,147	17,079	34,856	29,556
Southern	21,362	21,161	449,202	387,274
Northwestern	50,725	49,431	263,890	237,067
Central Western	18,583	15,960	343,612	375,035
Southwestern	12,442	15,023	207,436	224,823
Total	379,027	349,302	1,983,751	1,898,392

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	1928
Limestone flux	*379,027*	*349,302*
Sand, stone, gravel	*1,983,751*	*1,898,392*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 6:

TRUNK LINE ASSOCIATION DOCKET

19573. **Crushed stone, sand** (other than blast, engine, foundry, glass, molding or silica) and **gravel, slag blast, furnace, crushed,** in bulk, carloads (See Note 2), from Buffalo and Attica, N. Y., to P. S. & N. R. R. stations, Friendship, N. Y., to West Eldred, Penn., incl., $1.25 per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates on like commodities rrom and to points in same general territory.

19581. **Crushed stone,** carloads (See Note 2), from Otisville, N. Y., to Erie R. R. stations, Pond Eddy, Lackawaxen, Mast Hope, Penn., Cochocton, N. Y., Callicoon, Long Eddy, Stockport, Deposit, Gulf Summit, N. Y., and Great Bend, Penn., and various, rates ranging from 85c to $1.50 per ton of 2000 lb. Reason—Proposed rates are same as now published on sand and gravel between same points.

19617. To revise rates on (a) **sand** (other than blast, engine, filter, foundry, glass, molding, quartz, silex or silica) and **gravel** (other than molding gravel) and (b) **sand, blast, engine, foundry, glass, molding, quartz, silex, silica and filter**; also **molding gravel,** from southern New Jersey sand shipping points on the P. R. R. and Reading R. R. to points on the L. & N. E. R. R. and D. L. & W. R. R., (a) rates ranging from $1.95 to $2.05, and (b) rates ranging from $2.15 to $2.25 per ton of 2000 lb. Reason—To place the rates on a comparable basis with rates now in effect from origin territory now involved to contiguous territory such as Easton and Bethlehem.

19620. **Sand** (other than blast, engine, foundry, glass, molding, sea or silica) and **gravel,** carloads (See Note 2), from Gravel Pit Switch, Penn., to Lake Ariel, Penn., 60c per net ton. Reason—To meet truck competition.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

19630. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville, Penn., to Coatesville, Whitford, Downington and Gallagherville to Caln, Penn., $1.05 per 2000 lb. Reason—Proposed rates are comparable with rates now in force to Lenni, Chadds Ford, Brandywine, Summit, Penn., etc.

19633. (A) **Sand, blast, engine, foundry, glass, molding, quartz, silex and silica,** (B) **gravel and sand,** N. O. I. B. N. in O. C., except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads (See Note 2), from Kenvil, Succasunna, Mount Arlington, Netcong and Hackettstown, N. J., to Bethlehem, Penn.; (A) $1.17 and (B) $1.05 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Allentown, Penn.

19641. **Sand** (other than blast, engine, foundry, glass, molding and silica) and **gravel,** carloads (See Note 2), from Wadsworth, N. Y., and Maxwells, N. Y., to Reading Center, N. Y., $1.45 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Fargo, Darien Center and Alleghany, N. Y.

M-1002. To revise the rates on **ground** and **agricultural limestone,** carloads, from Buffalo to points in New York state so as to apply only on intrastate and ex-lake traffic.

19647. (A) **Sand,** other than blast, engine, foundry, molding, glass, glass silica, quartz, or silex, carloads; (B) **Sand, blast, engine, foundry, molding, glass, silica, quartz or silex,** carloads (See Note 2), from Lewes, Del., to Port Norfolk, Norfolk and Portsmouth, Va., (A) $1.85, (B) $2 per ton of 2000 lb. Reason—Proposed rate is comparable with rate on like commodities for like distances, service and conditions.

19660. **Crushed stone,** carloads (See Note 2), from Bellefonte and Pleasant Gap, Penn., to Nisbet, Penn., 90c per ton of 2000 lb. Reason—The proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19664. **Crushed stone,** carloads (See Note 2), from Calcite, Penn., to Cleveland, O., $2.50 per ton of 2000 lb. Reason—The proposed rate compares favorably with rate from Gasport, N. Y.

19665. **Broken stone,** carloads (See Note 2), from Fort Deposit, Md., to Atlantic City and Margate City, N. J., $1.85 per ton of 2000 lb. Reason—The proposed rate is fairly comparable with rates on like commodities from and to points in the same general territory.

19668. **Stone, fire; stone, ganister,** carloads (See Note 2), from Chalybeate to Macley, Penn., inclusive, to Girard, Lowellville, Niles, Struthers, Youngstown, O., Farrell, Greenville, New Castle, Sharon, Sharpsville, Shenango, Penn., Warren, O., West Middlesex, Wheatland, Penn., Steubenville, Mingo Junction, Martins Ferry, Bridgeport and Bellaire, O., $1.90 per ton of 2000 lb. Reason—Proposed rate is on the same basis as Brookes Mills, Flowing Spring, Barree, Penn., etc., as per Items No. 5200 to 5215, inclusive, of Agent Wilson's I. C. C. A193.

19669. **Stone, fire; stone, ganister,** carloads (See Note 2), from Petersburg to Covedale, Penn., Williamsburg to Ganister, Penn.; Point View to Tyrone, Brick and Tile Co., Penn., Tipton to Altoona, Penn.; Duncansville to Brookes Mills, Penn., and Port Matilda, Penn., to Steubenville, Mingo Junction, Martins Ferry, Bridgeport and Bellaire, O., $1.90 per ton of 2000 lb. Reason—To establish the same rate to the above points as now applies to Warren, O., New Castle, Penn., etc.

SOUTHERN FREIGHT ASSOCIATION DOCKET

42004. **Limestone,** from Ladds and Portland, Ga., to Birmingham & Southeastern R. R. stations. Combination rates now apply. Proposed rates on limestone, ground or pulverized, carloads (See Note 1), except when cars are loaded to their visible capacity actual weight will govern, to Birmingham & Southeastern R. R. stations (in cents per net ton):

	From—	
To	Portland, Ga.	Ladds, Ga.
Cotton Valley, Ala.	221	227
Wilda, Ala.	221	227
Liverpool, Ala.	221	227
Wheatley, Ala.	221	221
Wares Mill, Ala.	221	221
Calebee, Ala.	221	221
Conifer, Ala.	217	221
Tuckabatchie, Ala.	221	221
Tallassee, Ala.	221	227
Bowens, Ala.	221	227
Asberry, Ala.	221	227
Eclectic, Ala.	221	227

Suggested rates are made on the usual basis for establishment of rates on this commodity from Ladds and Portland, Ga., to southeastern points.

42034. **Limestone,** from Ocala, Fla., to Greensboro, N. C. No through commodity rates in effect, and combination applies. Proposed rate on ground or pulverized limestone, carloads, minimum weight 60,000 lb., from Ocala, Fla., to Greensboro, N. C., 340c per net ton, made on the same basis as observed recently in establishment of rate from Ocala to Birmingham, Ala.

42125. **Limestone or marl, ground or pulverized,** from N. & W. Ry. shipping points to stations on the A. C. L. R. R., S. A. L. Ry. and Atlantic and Carolina R. R. It is proposed to establish through commodity rates on limestone or marl, ground or pulverized, carloads, minimum weight 60,000 lb., from producing points on the N. & W. Ry. on the following basis:

To A. C. L. R. R. stations, same as to equidistant points on the A. C. L. R. R. except that in no case are the proposed rates to be lower than would be obtained under the scale authorized in connection with the S. F. A. Submittal 40203.

To S. A. L. Ry. stations, same as to equi-distant points on the S. A. L. Ry., except that to points on the Lewiston branch rates are proposed in line with rates to other points on the S. A. L. Ry. in that vicinity, as published in N. & W. Ry. I. C. C. 8233.

To Atlantic and Carolina R. R. stations: Rates to points on this line were made from Mascot, Tenn., by adding an arbitrary of 46c per net ton to rates to Warsaw, N. C., to stations Hill's Ave., N. C., to Middleton-Johnson Siding, N. C., and to stations West, N. C., to Kenansville, N. C., an arbitrary of 57c per net ton, and it is proposed to make rates from N. & W. Ry. shipping points by adding same arbitraries to the Warsaw, N. C., rates. Statement of the proposed rates will be furnished upon request.

CENTRAL FREIGHT ASSOCIATION DOCKET

19605. To establish on **crushed stone,** carloads (See Note 3), Lima, O., to Willshire, O., 80c per ton of 2000 lb. The Erie R. R. Co. will only absorb $2.70 of connecting lines' switching charge at Lima, O. Present rate, sixth class, 240c per 2000 lb.

19606. To establish on **sand and gravel,** carloads (See Note 3), Fair Oaks, O., to Cumberland, O., 85c per net ton. Present rate, 90c per net ton.

19607. To establish on **sand and gravel,** carloads (See Note 3), Beach City and Barr, O., to Lima, O., 130c per net ton. Present rate, 140c per net ton.

19612. To establish on **crushed stone** and **crushed stone screenings**, carloads (See Note 3), Kokomo, Ind., to Santa Fe, Amboy and Converse, Ind., via Peru, Ind., and C. & O. Ry., 80c per ton of 2000 lb. Present rates, $1.27 to Santa Fe, Ind., and sixth class to Amboy and Converse, Ind.

19613. To establish on **crushed stone**, in bulk, in open cars, carloads (See Note 3), Middlepoint, O., to Oxford, O., via B. & O. R. R., 125c per net ton. Present rate, 340c per net ton, sixth class.

19614. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads (See Note 3), Wolcottville, Ind., to Adams Siding, Ind., via I. S. C., 80c per net ton. Present rate, combination of local factors to and from Conlog, Ind.

19657. To establish on **dolomite, raw or crude, and fluxing stone**, carloads, Carey and McVitty's, Ohio, to Cleveland and Lorain, Ohio, via N. Y. C. R. R. or N. Y. C. & St. L. Ry., rate of 90c per gross ton. Present rate, 100c per gross ton.

19701. To establish on **fluxing stone and dolomite stone**, carloads, Carey, Ohio, to Farrell, Greenville, Mahoningtown, New Castle, Sharon, Sharpsville, Shenango, Stoneboro, West Middlesex and Wheatland, Penn., rate of 118c per gross ton. Present rate, 126c per gross ton.

19708. To establish on **crushed stone**, carloads, East Liberty, O., to Ada, O., rate of 85c per net ton. Present rate, class. Route, via N. Y. C.-P. R. R.

19711. To establish on **sand and gravel**, carloads, Sandusky, O., to Ney, O., rate of 130c per net ton. Route, N. Y. C. & St. L. Ry., Latty, and Cincinnati Northern. Present rate, sixth class.

19712. To establish on **crushed stone**, carloads, Kokomo, Ind., to Chicago, Ill., rate of 75c per net ton for single line and 95c per net ton for joint hauls. Present rate, sixth class.

19717. To establish on **sand** (except blast, engine foundry, glass, molding or silica) and **gravel**, carloads, Gallipolis, Kanauga and Pomeroy, O., to Clay Court House and Clendennin, W. Va., following rates. Present and proposed rates (in cents per net ton):

To	Prop.	Pres.
Clay Court House, W. Va.	160	(1)171
Clendennin, W. Va.	150	(1)151

(1) Rates from Kanauga, O., only; other points, class rates apply.

19734. To establish on **crushed stone and crushed stone screenings**, carloads, Delphos, O., to Defiance, O., via Holgate, O., and B. & O. R. R., rate of 80c per ton of 2000 lb. Present rate, sixth class.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4669. **Stone, broken, crushed or ground**, carloads, from Quincy, Ill., to destinations in Wisconsin.

To (representative points)	Pres.	Prop.
Burlington, Wis.	$3.30	$2.14
Milwaukee, Wis.	3.40	2.05
Waukesha, Wis.	3.30	2.14
Racine, Wis.	3.40	2.05

4674. **Sand**, all kinds, carloads, and **gravel**, carloads, from Ottawa, Ill., to Rochester, N. Y. Present rate, $4.91; proposed, $4.40 per net ton.

4677. **Sand and gravel**, carloads, from New London, Mo., to Illinois stations on the Wabash Ry. Rates per net ton. Present, combination basis.

To (representative points)	Prop.
Quincy	90
Kinderhook	110
Pittsfield	110
Alladin	90

4300. Sub. 1. **Silica, rock, crude**, carloads (See Note 2), but not less than 60,000 lb., from Gale and Thebes, Ill., to Elco and Tamms, Ill. Present, none; proposed, 70c per net ton.

4676. **Crushed stone**, carloads (See Note 3), but not less than 40,000 lb., from Buffalo and Linwood, Ia., to Disco and Lomax, Ill. Present rate, 230c; proposed, 113c per net ton.

4685. **Sand, gravel and crushed stone**, carloads, from Joliet district to Carrollton, Ill. Present rate, $1.35; proposed, $1.26 per net ton.

4688. **Sand and gravel**, carloads, from Decatur, Ill., to Bloomington, Ill. Present rate, $1.01 per net ton; proposed, 76c per net ton.

SOUTHWESTERN FREIGHT BUREAU DOCKET

15793. **Crushed stone**, from Garnett, Okla., to Springfield, Mo. To establish rate of 7c per 100 lb. on crushed stone, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity of car will govern, from Garnett, Okla., to Springfield, Mo. Shippers have requested the publication of rate of 7c per 100 lb. on this traffic, which they state is the present rate from Tulsa and Price, Okla., on sand.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

15375. **Sand, building, common or run-of-bank**, carloads (See Note 2), from Beacon, N. Y. (ex barge), to Billings, Lagrange and Verbank, N. Y., 70c per net ton. Reason—To provide rates same as in effect for comparable distance.

15377. **Stone, broken or crushed**, carloads (See Note 2), from Meriden (York Hill Quarry), Conn., to Higganum, Conn., 70c per net ton. Reason—To provide some rate as now applies from Branford, Conn., etc.

15390. **Stone, crushed or broken**, in bulk, in open cars, carloads (See Note 2), from East Willingford (Reed's Gap Quarry), Conn., to Clinton and Lyme, Conn., 85c per net ton. Reason—To meet motor truck competition.

15398. **Run of bank sand and gravel** from Lancaster, Mass., to Worcester, Mass., and from Maynard, Topsfield, South Acton, Gleasondale and Littleton, Mass., to Boston, Mass., $25 per car. Reason—To meet motor truck competition.

WESTERN TRUNK LINE DOCKET

810A. **Stone, crushed**, carloads (See Note 2), but not less than 40,000 lb., from Pinehill, Mich., to Marseilles, Ill. Present rate, $3.10 per net ton; proposed, $2.70 per net ton.

1564P. **Stone, crushed**, carloads (See Note 3), but not less than 40,000 lb., from Dell Rapids, S. D.

To	Pres.	Prop.
Orange City, Ia.	$1.56	$1.20
Osage, Ia.	2.22	1.94

2051GG, Sup. 1. **Stone, crushed**, carloads (See Note 3), but in no case less than 40,000 lb., from Sioux Falls, Spencer, S. D., also Quartzite, Minn., to Crawford, Neb. Present rate, 20½c; proposed, 18½c.

Sand and Gravel Case Is Dismissed

THE public service commission dismissed from its docket recently the original and amended complaints filed against the Virginian railroad, the Chesapeake and Ohio railroad, the New York Central railroad, defendants, and Pfaff and Smith Builders Supply Co. and the West Virginia Sand and Gravel Co., interveners, by the Zenith Sand Co. The commission stated that it was of the opinion that the complainant had not sustained its amended complaint.

So far as the case related to rates, the matter was settled on April 3, when the commission decided the Pfaff and Smith case, it was said. The remaining objection which was against the railway's method of absorbing switching charges in an industrial section like Charleston was the point that was settled recently with the dismissal of the case.—*Charleston* (W. Va.) *Gazette.*

Conference on Illinois Sand and Gravel Rates

THE committee of carrier and shipper representatives appointed to work out a compromise adjustment of the rates on sand and gravel and crushed stone to destinations in Illinois south of the line of the Pennsylvania from St. Louis to Terre Haute, Ind., met with Examiner Fuller, of the commission, and representatives of the Illinois commission at Chicago, October 1. The conference continued until October 4, when it was adjourned. While considerable progress was said to have been made in the settlement of the issues involved, all of the matters could not be agreed on. As hearings have been held in the two Illinois commission dockets, 17841 and 17863, that commission will proceed with their disposition, in line with the co-operative plan. A meeting was set for October 15, at Chicago, before Examiner Fuller, to consider what action should be taken in connection with the interstate cases. It was stated that the parties were prepared to go ahead at that time with a hearing in I. and S. 3093, involving single-line rates on the Big Four and C. & E. I., but that a future date would have to be set for hearing in the complain case, docket 21372, involving joint line rates from Greencastle, Ind., to destinations on the Burlington, C. & E. I. and I. C.—*Traffic World.*

Crushed Stone Rates in Missouri and Kansas

EXAMINER W. J. HARRIS, in No. 20070, Consumers Material Corp. vs. Santa Fe et al., has recommended that the commission find interstate rates on crushed stone, from Birmingham, McDowell, Pixleys, Hueyette, Melville and Leeds, Mo., Rosedale, Kan., and on gravel from Holliday, Kan., to destinations in Kansas and Missouri not unreasonable in the past. He said that as no damage had been shown to have resulted from any undue prejudice that might have existed, reparation should be denied.

As to the future, Harris said the commission should find the rates on crushed stone, from Melville, Mo., to points in Kansas and from Rosedale, Kan., to destinations in Missouri, unreasonable to the extent they exceed or may exceed rates based upon a distance scale the same as that now in effect intrastate in Missouri, known as the Missouri intrastate scale, for single-line hauls, plus an arbitrary of 20 cents per ton for hauls over two or more lines not parts of the same system. Distances are to be calculated from Kansas City and the joint-line arbitrary is to be added when shipments move out of Kansas City over lines other than those of the originating carrier.—*Traffic World.*

Ohio Companies Enter Stone Rate Fight

THE National Lime and Stone Co., Findlay, Ohio, and Herzog Lime and Stone Co., Forest, Ohio, have asked the state utilities commission for authority to be made parties to a suit brought against the Pennsylvania railroad by the National Mortar and Supply Co. The suit against the railroad seeks an investigation of the company's rates on stone.—*Tiffin* (Ohio) *Advertiser.*

I. C. C. Decisions

18785. Sand and Gravel. The commission in the case of John Wroe vs. Louisville and Nashville, has found the rate on sand and gravel from Cleves, Ohio, a point in the Cincinnati switching district, to Walton, Ky., not unreasonable either now or in the past. It has found the rate from Cincinnati proper to Walton unreasonable to the extent it may exceed, in the future, 60 cents per net ton.

Atlas Company to Build Cement Mill at Waco, Texas

IT WAS ANNOUNCED at Waco, Tex., September 23, that negotiations had been completed for the construction of a $2,000,000 cement plant by the Atlas Portland Cement Co. of Texas, a subsidiary of the Atlas Portland Cement Co., 25 Broadway, New York City, which now operates portland cement plants at Coplay, and Northampton, Penn., Hannibal, Mo., Leeds, Ala., Hudson, N. Y., and Independence, Kan.

The initial capacity of the new plant will be 1,000,000 bbl. per year, according to announcements. In making known his decision to increase its operating mills to include a plant in Texas, John R. Morron, president of the Atlas Portland Cement Co., is quoted as follows:

"Our intention to build and operate at Waco the most modern cement mill possible of construction accords with the long-established policy of our company to follow the demand for our product and render to our present and prospective customers the well-known Atlas service for high quality, reliability and promptness of delivery. The expanding industrial life of Texas with its broadening scope of interests by the state and its citizens, coupled with the fact that Atlas quality and dependability were already appreciated, were the factors in making our determination.

"An aggressive construction program will be pursued in order that the plant be in operation at as early a date as possible. Located at the center of population it will supply Atlas portland cement promptly and economically to the construction industry throughout the larger part of the state. Until this plant is in actual operation our trade will be supplied as at present, from our existing plant at Independence, Kan. By incorporating the Atlas Portland Cement Co. of Texas, under the laws of Texas, we expect to become a helpful factor in the growth of the state's industrial welfare."

International Cement Has New Diesel Towboat

BUILT SPECIFICALLY for operations in towing service for the Louisiana Portland Cement Co. between its lime rock quarries at St. Stephens and Mobile, Ala., the twin-screw Diesel towboat *Incor*, owned by the International Cement Corp., of New York, of which the Louisiana Portland is a subsidiary, arrived at Mobile recently, and left on its maiden voyage up the river with a tow of three barges.

F. W. Morris, district superintendent, said the *Incor*, which is equipped with 720-hp., will replace a river steamer formerly operated in the towing service between St. Stephens and Mobile. The barges of lime rock are delivered at Mobile to the seagoing tug *Lone Star* for the remainder of the voyage to New Orleans.

The *Incor* was built at Charleston, W. Va., and is in command of Captain P. R. Miller. One of the barges the vessel is towing upriver on its maiden voyage is carrying a new electric shovel, the second to be placed in service at the quarry near St. Stephens.—*Mobile* (Ala.) *Register*.

Portland Cement from Slag Using Waste Heat from Coke and Blast Furnaces

THE DAVISON COKE AND CHEMICAL CO., Pittsburgh, Penn., is soon to begin construction of a portland cement plant, a byproduct coke plant and the production of pig iron on Neville Island, below Pittsburgh, in the Ohio river.

The project has been held in abeyance for several months but the placing of an order for $625,000 worth of cement making machinery with the Allis-Chalmers Manufacturing Co., indicates that the details of the development have been completed.

Early this year the Sharpsville Furnace Co., manufacturers of pig iron, bought the Neville Island blast furnace from American Steel and Wire Co. and 200 acres of ground.

The furnace had been under lease by the Carnegie Steel Co., but had been idle for years due to its separation from other plants. During the war it was proposed to make the furnace a nucleus for a large armor plate mill.

The name of the Sharpsville Furnace Co. has been changed to the Davison Coal and Coke Co. The president of the organization is George S. Davison, who is also president of the Gulf Oil Corp. The Mellon family is understood to be interested in the Neville Island development.

A large byproduct coke plant will be built by the Koppers Co. The entire project will be one of the greatest industrial developments undertaken close to the city of Pittsburgh in recent years.

At the time the furnace was bought there was much speculation as to the reason for acquiring a merchant blast furnace when the production of pig iron has been at unprofitable levels for the past three years.

The location of the furnace and the possibilities for integration with coking and cement manufacture offer the explanation.

Neville Island is a strategical point. Coal can be shipped down the Monongahela and Ohio Rivers at remarkably low cost.

A large market is available in Pittsburgh for the domestic sizes of coke. The bulk of the coke can be used for fuel in the blast furnace. The blast furnace gas can be used to heat the coke ovens.

In addition to making pig iron from coke, ore and limestone, the blast furnace will produce large quantities of slag.

The slag will be the raw material for the production of cement. The gas liberated by the byproduct coke ovens can be used to supply heat for cement manufacture.

In the winter, when local gas companies have to meet a peak demand part of the gas can be sold for distribution to consumers in Pittsburgh.

To return to the rivers. Low cost transportation will be available for the shipment of pig iron and cement to southern points.

The Neville Island development will surpass the boast of the meat packers that everything is used but the squeal. It will be the nearest practical approach to the fabulous cat fur farm which was supposed to have been conceived by a smart promoter.

Cats were to be raised on a large scale for their fur. To feed the cats a great number of rats were also to be raised. The rats were to be fed on what remained of the cast after the skinning operation. Thus the entire farm would be self-supporting.—*Pittsburgh* (Penn.) *Sun-Telegraph*.

Florida Cement Starts Up Kilns After Shut-Down

FIRES were lighted in the kilns of the Florida Cement Co., Tampa, Fla., October 1, F. M. Traynor announced recently. The three kilns have been cold since early in August, largely because of importation of cement from foreign countries.

Only one kiln was fired October 1, and a second will start as soon as conditions warrant it, Mr. Traynor said. One kiln will employ 50 to 75 men, and two kilns about 100; adding from $10,000 to $15,000 to Tampa's monthly payroll. From 30 to 40 men were kept at the plant during the time the kilns were cold taking care of shipments and other phases of the industry.

When the fires in the kilns were drawn, there was sufficient cement in the silos to last three or four months, Mr. Traynor said, so that at no time was there any inconvenience to those using the product. An equivalent amount of clinker, half finished product, also is on hand.

Last year 306,681 bbl. of foreign cement was imported into Florida, an average of more than 25,000 bbl. a month, more than a quarter of the capacity of the Tampa plant, and much larger in comparison with what the plant was actually marketing. Conditions have been somewhat better this year, less than 50,000 bbl. being imported during the first half of the year.

The Tampa plant sets the price of American cement used in Florida, and to compete here plants outside of the state have to absorb the freight difference.

The plant, reopened, probably will operate indefinitely. The company has obtained a number of important contracts recently, the Caloosahatchee bridge at Fort Meyers, which will take about 30,000 bbl.; half of the requirements of a state highway recently awarded in Leon county; part of the contract for a concrete highway being built in Manatee county; paving in Miami that will require about 12,000 bbl., and a bridge there that will take 15,000 bbl.—*Tampa* (Fla.) *Tribune*.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Straub Cinder Block Patent Is Held To Be Valid and Infringed

United States Court of Appeals Reverses Decision of the District Court in Atlantic City Case

THE MUCH DISCUSSED Straub cinder block patent case was decided September 26, 1928, by the United States circuit court of appeals for the third circuit at Philadelphia. The case involved the validity and infringement of Straub letters patent of the United States No. 1,212,840 for building block and method of making the same. The patent was issued to Francis J. Straub of New Kensington, Penn., and it is now owned by Crozier-Straub, Inc., which is a subsidiary of National Building Units Corp., whose general offices are at 1600 Arch street, Philadelphia.

Crozier-Straub, Inc., was plaintiff in the cases before the court of appeals. The defendants were:

(a) Thomas Graham and Atlantic City Building Block Corp. of Atlantic City, N. J.

(b) Jacob Melmod and Sea Shore Brick and Building Block Co. of Atlantic City, N. J., and

(c) Robert G. Downer of Westville, N. J.

In its decision the circuit court of appeals definitely holds that Straub Patent No. 1,212,840 is valid. It also holds that all of the defendants have infringed, and remits the cases to the lower court to enter decrees for permanent injunctions against further infringement on the Straub patent, and to assess damages and profits from the defendants on account of past infringements.

The Straub patent had been previously declared valid and infringed by the same court of appeals in the year 1919, in the case of Straub vs. Campbell.

The defendant in the present cases had the backing of an association of alleged infringers, who employed able counsel and experts. The trial occupied many days. The volume of evidence contained over 600 pages, and the book of exhibits over 300 pages. The decision of the lower court, in which the literature of concrete products manufacture was thoroughly reviewed, was published in Rock Products, December 10, 1927.

Editor's Note

THESE EXTRACTS from a court decision in a famous cement products case are much more interesting than the ordinary run of court decisions. They give quite clearly the court's reason for holding an improvement in construction technique an invention. This and the lower court decision, referred to, give an extraordinarily comprehensive review of the patent literature of cinder concrete products.—The Editor.

It is believed that the decision of the court of appeals effectually settles the status of the cinder building unit industry, so far as the Straub patent is concerned. Other cases, however, remain to be disposed of. A pending suit which will be speedily moved for trial was brought on the Straub patent in the federal court for the eastern district of Pennsylvania. The defendant in that suit is William J. Harley, doing business under the trade name Cordery Building Block Co., whose plant is at Allentown, Penn.

The following extracts from the decision of the court of appeals make the status of the patent clear:

"In the suits at bar the learned trial judge, though frankly stating that in his opinion the patent is invalid and expressing his belief that had the record before this court in the Campbell case been the same as that which was before him in these cases our judgment would have been different, nevertheless felt constrained to follow the decision of this appellate court as to the validity of the patent but dismissed the bills on findings of non-infringement.

"In view of this conviction of an able and earnest judge and also because the records in the two cases (regarding the last group as one litigation) are without doubt very different in volume, we shall give the issue of validity more extended discussion than is ordinarily given at a second trial on the same patent.

Invention Is in the Constituents

"The building block of the patent is a simple one. It is of familiar shape and is intended generally for uses long known. Invention in the product, if any, resides in its constituents which are, cement and water (both old) and 'a mixture of coarse and fine coal cinder and ashes, retaining all of the original mass.' Invention in the process, if any, must be found in the manner of making blocks of this constituency, that is, 'in crushing and grinding an original mass of coal cinder and ashes without separation, mixing the entire mass of coarse and fine material with a suitable proportion of cement and water, and molding and drying the same in block form.'

"We recognized in the Campbell case that the use of cinders in groutings, foundations, walks, roads and other structures was old and we learned from the few patents in the record that ashes and cinders, screened or washed or otherwise prepared and selected and proportioned with other ingredients had appeared in the patent art, but (again from the record) we found that no one before Straub had, when making building blocks, conceived the idea of taking the *whole* ash product—cinders and ash alike, half burned and wholly burned, lumps and dust—in fact, *the entire run of the grate,* using the whole product in its raw state and rolling or grinding the whole mass. This process appealed to us as new and we also thought the product of the process, namely, the cinder block, was new, not in its form but in its make-up and characteristics. While in form it is that of the ordinary building block, it has marked features, some improvements on old blocks, others wholly new.

Alleged Novelties in Cinder Block

"All blocks are more or less soundproof,

but Straub's is more soundproof than others with hard aggregates, doubtless for the reason that instead of being a solid mass as when made of sand or stone aggregate it is porous, containing myriads of cells; it permits nails to be driven into it without breaking and firmly holds the nails in place; it is lighter in weight and cheaper to make than any block brought to our attention; though porous and light, it is strong; and, though strong, can be broken on nearly straight lines. With these characteristics its usefulness as a building material, especially in dispensing with the woodwork ordinarily set in the masonry for plastering, and for window-working and door-working, seemed manifest. There was no evidence of how the invention was received by the trade because when that suit was brought the patent was only about a year old and but a small number of blocks had been made in the patentee's crude little plant and sold in one locality.

"On the record in the Campbell case we thought, and still think, there was invention.

"From the record in the suits at bar we have discovered that the characteristic of the block which most strongly impressed us, namely, its 'nailability,' was not entirely new with Straub because one of the cited patents (Atterbury) disclosed a block made of cement, cinders and asbestos fibre into which nails can be driven—how effectively we do not know because as we use the term 'nailability' in connection with the Straub block we do not limit its meaning to mere penetrability but extend it to holding the nails in place for the useful purpose of supplanting wood which theretofore had been employed in layers between the masonry to receive nails and hold them; yet none of the cited patents disclose a block made entirely of ash and cinder aggregate that is nailable.

"Just why the Straub block in comparison with other blocks is more sound-proof, that it will receive and firmly hold nails, that it is readily broken along desired lines, that it is light yet strong, we do not know and seemingly Straub did not know when he was awarded the patent. But that does not mitigate against the fact of invention, for it is not necessary that Straub should have understood and been able to state the scientific principles underlying his conception. Nor is it necessary that a court in order to pass on the validity of a patent should in every case understand and be able to state the principles of the invention. It is not known even now why Straub's block has these qualities. It is persuasively suggested by experts that they are due to the cellular character of the block and that this is due to the natural properties of the cinder ingredient.

Previous Patents and Practice Disposed of

"Confessedly the record in the Campbell case was meager. It contained but few patents and no serious instances of prior use. The record in these cases contains 46 prior patents and publications which deal with, touch or cover ashes and cinders as aggregates in cement mixtures for a variety of purposes, disclosing a long and wide study of their uses. Regarding those patents and publications mentioned in the opinion of the district court (where the patent numbers and publication dates may be found) as the strongest references against the validity of the patent in suit, we shall review in order to contrast their constituents and disclosures with those of the product claim (2) of the plant, remembering that it calls for 'a mixture of coarse *and* fine coal cinder *and* ashes, *retaining all of the original mass,* water and cement.'

"The Heim patent (1869) was for a building block of one part stone-lime (the portland cement industry was developed later), coal ashes and coal *dust* in equal quantities of four to eight parts and two parts of potash. When this substance becomes dry it is extremely hard and highly impervious. It is the opposite of the Straub block, which is resilient and cellular.

"The Dreyer patent (1879) disclosed a building block of one part each of portland cement, *mineral wool* and three parts coal ashes.

"The patent to Shinn (1883) proposed to make a mortar by using 80 to 90% of *finely divided* or pulverized coal ashes and 20% of hydraulic lime, cement or plaster, which may be used for making a concrete or artificial stone or brick by mixing with *broken stone, gravel, brick,* cinder or *slag.*

"Ransome patent (1885) disclosed a building block of *washed* or *purified* ashes and lime.

"The patent to Lorenz (1887) was for an artificial building stone, five parts of clear ashes, four of cinders and one of cement. This looks like Straub; but Lorenz did not utilize the entire original mass; he first mixed an arbitrary amount of fine ashes with a certain amount and then added an arbitrary amount of cinders or clinkers. The resultant product was an artificial stone that could be polished. The Straub block is not susceptible of such treatment.

"A later patent to Lorenz (1893) was for an artificial stone made of *burned sand,* cinders and ashes.

"Krolman had a patent (1902) for a fireproof *floor* composed of one part of cement and eight to ten parts of cinders. He also used a proportion of sand. There was no suggestion that cinders in the original mass should be used.

"Brunson was awarded a patent (1904) for an artificial stone consisting of cinders, *sand, barites,* cement, lime and water.

"The patent to Marsden (1906) was for a building block made of ground *coal,* clinkers, ashes, cement and *calcined gypsum.* Marsden prescribed that the coal clinkers and ashes should be ground so that they will pass through a screen to about the fineness of granulated sugar. Naturally, a block of this material could be cut and sawed.

"Bitterman (1912) uses *coke breeze* and cement to form building blocks and asserts that nails can be driven into them.

"The invention of the patent to Atterbury (1915) is for artificial stone of crushed cinders, cement and *asbestos fibre,* the latter a highly cellular product. The blocks have cellular texture and of course possess nailability.

"The *Engineering News* referred to the practice of using clinkers from steam boiler furnaces for an aggregate together with concrete but prescribes that the cinders must be *washed* free of foreign particles.

"The *Cement and Engineering News* spoke of concrete blocks formed from waste crushed clinker obtained from the city refuse destructor plant. Whether that means coal cinders or ashes of rubbish or garbage is not clear and there is no suggestion of the proportions of ashes and cinders.

"'The Architect's and Builder's Pocket-Book' wrote of one mixture made of cement and *fine* cinders and another of cement and *coarse* cinders. The article makes no mention of building blocks made of both fine and coarse cinders as well as intermediate sizes as in Straub.

"The *Proceedings* of the Second Convention of the National Association of Cement Users stated that cinders are sometimes used for block work, and if *clean* and of *medium coarseness* will give fair results.

"The *Engineering Record,* Vol. 63 of 1911, merely pointed out prior knowledge of clinker concrete made of one part portland cement and six parts crushed clinker and is silent as to whether crushed clinker is selected or is the run of the grate.

"The *Concrete Cement Age* told of the construction of a group of houses built of steam cinder concrete in the proportions of one part of cement and seven of cinders. But this was poured concrete and not in the form of units. It does not say that the entire original mass of cinders was utilized.

"The record in the instant cases also contains four instances of alleged prior public use which are cited as anticipations. Only one, that of Bell, calls for discussion.

"Bell was a manufacturer of light building blocks made of gypsum and used not in weight-sustaining walls but mainly in partitions. For a short time in 1905 or 1912 he used cinders instead of gypsum in making these blocks. The cinders were crushed, then screened into two sizes, fine and coarse, and then the coarse and fine were mixed in about equal proportions with cement at about the ratio of one part of cement to seven of combined cinders. Seemingly this was the cinder aggregate of the Straub block. Just what was the sense of separating and grading the cinder mass and then combining the separated and graded portions we do not know, but we do know that the result was for some reason different from that of Straub's use of 'the original mass,' the straight run of the grate, unscreened, ungraded, unseparated. It was different in color, exterior surface and interior texture and in structural and compressive strength, and different in the important fact that it made no impress upon the art whatever.

The block in evidence admits a nail but because of softness it will not hold it firmly. We do not regard Bell's limited practice and different product as an anticipation of Straub's invention.

"We have been anxious fairly to show the difference between the record in the Campbell case and that in the cases at bar. The latter reveails the astonishing amount of attention which for 50 years inventors in the cement art have given the subject of cinder aggregates. It does not show, however, that their inventions made any distinctive impress upon the building art. On the contrary, it proves that it was not until Straub's invention that the trade turned to blocks with cinder aggregates. Hence we must read the Straub invention in the light of the many prior patents and publications. A study of these has convinced us that our decision in the Campbell case, whether by accident or otherwise, was right. It shows that prior inventors and writers had for half a century, indeed from the very beginning of the portland cement industry, regarded cinders as an aggregate in cement mixtures and had dealt with them in a great number of combinations and proportions and that they had hit upon nearly everything except that which Straub hit upon and had practically surrounded him, yet, we think, without touching him. In some instances they came pretty close, indeed very close, but missed. This very activity in a rapidly expanding art indicates to our mind that if all the others failed to see what Straub saw, then Straub saw something new; and the fact that he saw it through a maze of inventions and publications which others failed to penetrate argues for invention. Moreover the fact that, since our decision sustaining the patent, Straub's conception has founded a great industry, while the conceptions of others resulted only in desultory and sporadic activities, indicates that great usefulness of Straub's invention and justifies our previous finding.

"That the Straub block contains patentably new and useful qualities is clearly evidenced by the unusual demand for it which developed immediately on its appearance in the trade. That the block was new to the building trade, and useful, and has advanced the art substantially, is proved by the fact that in 1919, the year in which the patent was sustained and the patentee began seriously to exploit it, 18,000 blocks were sold by him. In 1926 his 77 licensees sold 24,533,821 blocks, and within the span of these years 77,268,792 had been made by licensees under a royalty of ¾ cents per block and taken by the trade. This in masonry space is the equivalent of nearly 1,000,000,000 bricks.

"Besides creating a new industry the Straub invention, oddly enough, has given a value to a waste product of other industries.

"Manufacture of the blocks by licensees at widely separated points for local consumption as against mass production at one point for transportation to distant points of consumption is peculiar to the product and is made necessary by the fact that to make a profit the raw material of cinders must be locally available in sufficient quantities and be either free or very cheap. Licenses granted in different trade areas meet this requirement. So at the beginning the licensees obtained their raw cinders from local furnaces for the hauling, but as the demand grew the otherwise free material acquired a money value and now sells at about $15 a carload. In one instance where before the patent it cost the operators of certain furnaces from $7000 to $9000 a year to remove cinders, they now have an annual profit of $15,000 from the sale of cinders for use in the Straub block.

"After a careful study of a record which, judged from its size and character, must very nearly cover the art, we are constrained again to sustain the validity of the claims of the patent in suit."

Arlington Heights, Ill., Products Company to Expand

NEGOTIATIONS have recently been completed by the Arlington Heights Concrete Products Co. of Arlington Heights, Ill., for the acquisition of a 5-acre tract of land in the southeastern portion of the village as a site for a new plant. The tract is adjacent to the C. & N. W. R. R. and at present is zoned for industrial purposes. There is a switch track serving the property, and a 200-ft. frontage on the main line. Frank Busse and Paul Taege, owners of the products company, have had this move forced upon them because of the growth of their business during the past three years. Four separate additions have been made to the present plant during that time, and now, with no more room for expansion, it was necessary to obtain a larger site for a new plant.

The new plant will manufacture chiefly haydite products, and will itself be constructed of haydite. It will contain the latest developments for handling the material and the finished products efficiently. The building will contain the material bins, manufacturing equipment, and kilns, and there will be ample yard space for storage. At present the site is a cornfield, and the company cannot go ahead with its construction program until after the harvest, as that is one of the terms of the contract. However it is expected that the plant will actually be started within a few weeks.—*Arlington Heights* (Ill.) *News.*

Concrete Sewer Pipe Winning on West Coast

A CONTRACT to supply concrete sewer pipe for the second unit of the Kraft mill at Port Townsend, Wash., has been awarded the Port Angeles Concrete Products Co. Under the contract the company will supply 1000 ft. of 24-in. pipe and incidental quantities of 15-, 12- and 8-in. pipe for November delivery.

The Longview Concrete Pipe Co., Longview, Wash., W. A. Sharp, manager, will supply the pipe for a sewer installation at St. Helens, Ore., at a cost of $55,000. The councilmen unanimously voted to purchase the Longview product after receiving written and personal recommendations from various executives of northwest cities that have used most successfully the same product. This order will keep the Longview plant busy during the fall and winter months.

Pueblo Gravel Producer to Make and Sell Ready-Mixed Concrete

SAND AND GRAVEL BUSINESS, long the mainstay of the Fountain Sand and Gravel Co., Pueblo, Colo., now amounts to a larger volume than ever before, due probably to the growth of the byproducts departments.

A comparatively new idea in Pueblo a year ago was the introduction of the Red-E-Mix concrete which has become very popular in the construction business because of its time-saving facilities. This product bears this name which applies to the mixing in a central plant, because the contractor merely has to give his order for concrete, the quantity and quality of which he will need for the particular job and when the concrete arrives all that is necessary is to pour it into the forms.

The equipment of the Fountain Sand and Gravel Co. is such as to accommodate really large projects such as the recently completed strip of paving on West Fourth street on which Red-E-Mix concrete was used. This is just one of the fields in which this company has developed from a purely sand and gravel hauling company.—*Pueblo* (Colo.) *Star-Journal.*

Florida Travertine Deposit Being Developed

FRANK A. HOWARD of Lakeland, Fla., is general sales manager for the Florida Traventine Corp. which recently began quarrying its first rock from the mine near Bradenton.

It is said that there are but two other deposits of travertine rock known in all the world. Both of these are in Italy. And it is claimed that the Florida rock gives promise of being of even better quality than the imported product.

Travertine rock is utilized for facing the interiors of public buildings, banks and other structures. It is said to take an elegant finish and to present a beauty that is particularly pleasing to the eye.

The plant in Manatee county is only about half completed, it is explained. A 25-ton derrick has been installed and the mining of stone is being begun in a small way for the present.—*Mulberry* (Fla.) *Press.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Mo.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.40	1.35	1.30	1.25	1.20	.....
Munns, N. Y.	.75	1.40	1.30	1.25	1.00	.....
Prospect, N. Y.	.85	1.15	1.15	1.15	1.15	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.....	1.35	1.15	.95	.90	1.20
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05@1.40	.95@1.50	1.15@1.50	1.05@1.50	1.05@1.50	.....
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.85	1.00	1.25	1.25	1.25	1.25
Stolle and Falling Springs, Ill.	1.05@1.40	.95@1.50	1.15@1.50	1.05@1.50	1.05@1.50	.....
Greencastle, Ind.	1.25	1.05	1.05	1.05	.95	.95
Lannon, Wis.	1.00	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Northern Ohio Points	.85@1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.00	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	1.00	1.10	.90	.90	.90	.....
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin Points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Cartersville, Ga.	1.20	1.65	1.65	1.45	1.15	1.15
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
Cutler, Fla.	.50@ .60r	.....	.....	1.75r	1.10@1.50r	.....
El Paso, Tex.	.50@ .75	.....	1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run, screened, $1 per ton					
Kendrick and Santos, Fla.	3½ in. and less, $1 per ton					
Olive Hill, Ky.	.....	1.00@1.10	.90@1.00	.90@1.00	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35e	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.00	1.15@1.25	1.15@1.25	.90@1.20	.90@1.20	.90@1.20
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

(r) Cubic yard.

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.75	1.25	1.25	1.25
New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35@1.40	2.00@2.10	1.80@1.90	1.40@1.50	1.40@1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90@1.25	.90@1.25	.90@1.25	.90@1.25	.90@1.25	.90@1.25
Springfield, N. J.	.....	2.00	1.90	1.50	1.50	.....
Toronto, Canada (m)	.....	5.80	.....	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)	.....	.....	1.50 to 1.85	.....	.....	.....
Toccoa, Ga.	.40	1.30	.....	1.25	1.30	1.30

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ½ in., 1.35. High calcite fluxing stone, 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yd.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh.. 4.50

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh.. 1.00

Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh..... 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh..... 1.50

Cartersville, Ga.—50% thru 50 mesh..... 1.50

Pulverized, per ton..... 2.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk..... 2.50

Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh.. 1.25
50-90% thru 100 mesh..... 1.35

Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk..... 3.50
Paper bags 4.75
100 lb. cloth bags..... 5.25

(All prices less .25 cash 15 days)

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton..... 6.00
90% thru 20 mesh, bulk, per ton..... 1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked..... 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95

Bulk 2.70

Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk..... 2.75

Joliet, Ill.—Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 50% thru 100 mesh..... 2.50

Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk..... 2.70

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk..... 1.75

Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk 2.25

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton..... 2.00

Middlebury, Vt.—Analysis 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 4.00; paper bags..... 5.00

Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk..... 1.35@ 1.60

Olive Hill, Ky.—90% thru 4 mesh..... 1.00
90% thru 100 mesh..... 2.00

Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100..... 2.50

100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk..... 3.50

100% thru 4, 30% thru 100, bulk..... 1.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk 2.00

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh..... 1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton	1.25
90% thru 4 mesh, per ton	1.10
Dubuque, Iowa—50% thru 4 mesh	.85
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.10@1.70
Stone City, Iowa — Analysis, 98% $CaCO_3$; 90% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.05
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.10@1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra)	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30@ .35
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
Rockwood, Mich.	2.25@ 3.00
San Francisco, Calif.	4.00@ 5.00
Silica and Mendota, Va.	1.75@ 2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	3.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.		.55	1.10	1.25	1.40	
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.65
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.60	.80			1.40	
Leeds Junction, Me.		.50	1.75		1.25	1.00
Machias Jct., N. Y.	.75	.65	.65	.65	.65	.65
Milton, N. H.		.50				.90
Montoursville, Penn.	1.00	.75	.70	.60	.60	.50
Northern New Jersey	.50@ .60	.50@ .60	1.25		1.35	1.25
Somerset, Penn.		2.00				
South Portland, Me.		1.00	2.50		2.25	
Troy, N. Y.	.50@ .75*	.50@ .75*	.80@1.00*	.80@1.00*		.80@1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30*	.20*	.30*	.40*	.40*	.45*
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40	.60	.65	.65	.65
Chicago, Ill.	.50	.50@1.45n	.60	.60@1.55n	.60	.60@1.90n
Chicago, Ill.	.30	.20	.30	.40	.40	.45
Columbus, Ohio¶		.65	.65	.65	.65	
Des Moines, Iowa		.30		1.40	1.40	1.40
Eau Claire, Chippewa Falls, Wis.	.40	.40	.55	.85	.85	
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50	.50	.60	.70	.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25e
Mason City, Iowa		.50	.85	1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35p	.35p	1.25q	1.25q	1.25q	1.25q
St. Louis, Mo.	1.15e	1.45f	1.45a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35		1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.85	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50	3.00	3.00		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45				
Fort Worth, Tex.	1.10	1.00	1.25	1.10@1.20	1.10	1.10
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.65@ .90	.65@ .90	2.25@2.50	2.25@2.50	2.25@2.50	2.25@2.50
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.35	.15	.85	.85	.75	.75
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .40	.50@ .60	.50@ .60	.50@ .60	.50@ .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			.35			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.	.75*		1.30	1.10	1.00	1.00
Chicago, Ill.	1.25m			.35		
Des Moines, Iowa				.60		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Fls., Wis					.65	
Fort Worth, Texas						.65
Gainesville, Texas					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅜-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (p) .65 cu. yd. (q) $1.75 to $2.00 cu. yd.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25			4.00	
Beach City, Ohio	1.75@2.00	1.75@2.00		1.50	1.75		1.50
Dresden, Ohio	1.25@1.50	1.25@1.50	1.50@1.75	1.00@1.25			
Eau Claire, Wis.						3.00	
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00			2.75@3.00	
Klondike, Mo.	2.00			2.00			
Massillon, Ohio	2.25	2.25		2.25	2.50		
Michigan City, Ind.				.30@ .35			
Montoursville, Penn.				1.35@1.60			
New Lexington, O.	2.00	1.25					
Ohlton, Ohio	2.00	2.00		1.75	1.75	1.75	
Ottawa, Ill.	1.00	1.25	1.50	1.75	1.25	3.50	2.00
Red Wing, Minn.(d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Mendota, Va.	Potters flint, 8.00@10.00g						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*@2.00h	1.50*@2.00h		1.50*@2.00h			
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand ,$3.00@4.25. (f) Crude and dry. (g) Also 7.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.30*		1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.†		.50*		1.15*	.90*	.90*	

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.							5.00	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[13]
Williamsport, Penn.	10.00@11.00	8.50@9.00	8.50@9.00		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[5]
CENTRAL:								
Afton, Mich.						10.00	7.50	
Carey, Ohio	11.50	7.50	7.50		8.00		8.00	
Cold Springs, Ohio		8.00	7.50				8.00	
Gibsonburg, Ohio	11.50	7.50	7.50		8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	11.50							
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50	8.25	.62½	7.00	1.50
Sheboygan, Wis.		10.50					9.50	2.00[1]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	8.00	1.50[3]
SOUTHERN:								
El Paso, Texas							7.00	1.50
Frederick, Md.		8.00@9.50	8.00@9.50			9.50[15]	7.00[15]	
Graystone & Landmark, Ala.	12.50	9.00		12.50			7.00	1.35
Keystone, Ala.	12.50	9.00	9.00	10.00			8.00	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00			7.50	1.35
Ocala, Fla.	14.00	12.00	11.00	13.00			11.00	1.40
WESTERN:								
Kirtland, N. M.							15.00	
Los Angeles, Calif.	15.00	14.00	12.00	18.00			13.50	
San Francisco, Calif.	19.00	17.50	13.00	17.50@19.00	14.50	.90[17]	13.00	1.85[17]
Tehachapi, Calif.[13]	10.80		6.75[11]	12.00			10.30	
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9]80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [22] To 9.00. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc (for grinding) 4.00@50.00
- Ground talc (20-50 mesh), bags 8.00
- Ground talc (150-200 mesh), bags 8.50@15.50
- Pencils and steel crayons, gross 1.00@ 2.00

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 7.50@8.50a
- Same, including 50-lb. bags 8.50@ 9.50

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 4.00
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel worker's crayons, per gross 1.00@ 2.00

Emeryville, N. Y.:
(Double air floated) including bags;
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50@20.00

Henry, Va.:
- Crude (mine run) 3.50@ 4.00
- Ground talc (150-200 mesh), bags 7.50@14.25

Joliet, Ill.:
Ground talc (150-200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00@15.00

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50@ 4.50
- Gordonsburg, Tenn.—B.P.L. 65-70% 4.25@ 4.75
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.25
- B.P.L. 75% 6.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00@ 9.00

Ground Rock

(2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 65% 6.00
- B.P.L. 72% 8.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 9.00
- Twomey, Tenn.—B.P.L. 65% 8.00
- Wales, Tenn.—B.P.L. 65% 11.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

- Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- New York City, N. Y.—Per lb., Cut mica (1½x2) 1.60
- Cut mica (8x10) 26.00
- Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00
- Rumney Depot, N. H.—Per ton, Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50@24.00
- Roofing mica 37.50
- Punch mica, per lb. .12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	¶12.50@‖14.50	¶12.50@‖14.50
Brighton, Tenn.—Pink marble chips	$3.00	$3.00
Crown Point, N. Y.—Mica spar		9.00@10.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.		8.00@ 9.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash		11.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	¶9.00@‖10.00	¶9.00@‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		4.00@ 5.50
Phillipsburg, N. J.—Royal green granite		16.00@20.00a
Randville, Mich.—Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00@20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		¶7.90@‖8.95
Wauwatosa, Wis.		20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 16.00.
‡Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L. (a) Including bags.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6%; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50@14.00; bulk	11.00@12.50
Pulverized, 95% thru 200 mesh; bags, 19.73@23.50; bulk	15.75@22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.)	18.00
Crude feldspar, bulk	9.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone	‡7.50@*9.00
Davenport, Ia.—(Limestone) bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville. Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks: Feldspar	14.00
Gypsum	7.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, $8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00@11.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50g
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@15.00*
Pontiac, Mich.	11.00
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50@14.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada (f)	†15.00c
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M, 10th of month. (d) 5% disc., 10th of month. (e) Delivered in city limits. (f) F.o.b. yard, 12.50. (g) Delivered Milwaukee, 13.00.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.70
Atlanta, Ga.		2.35
Baltimore, Md.		2.25@2.65
Birmingham, Ala.		2.00
Boston, Mass.	.68¼	2.23@2.73
Buffalo, N. Y.	.62½	2.00@2.50
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.24
Charleston, S. C.		1.85
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.45
Cincinnati, Ohio		2.62
Cleveland, Ohio		2.64
Columbus, Ohio		2.62
Dallas, Texas		1.80
Davenport, Iowa		2.24
Dayton, Ohio		2.64
Denver, Colo.	.63¾	2.55
Des Moines, Iowa		2.05
Detroit, Mich.		1.95
Duluth, Minn.		2.04
Houston, Texas		1.90
Indianapolis, Ind.	.54¾	2.59
Jackson, Miss.		2.44
Jacksonville, Fla.		2.60b
Jersey City, N. J.		2.13@2.53
Kansas City, Mo.		1.92
Los Angeles, Calif.	.62½	2.50
Louisville, Ky.	.55½	2.57
Memphis, Tenn.		2.44
Milwaukee, Wis.		2.20
Minneapolis, Minn.		2.12@2.22
Montreal, Que.		1.60
New Orleans, La.		2.07
New York, N. Y.	.60¾	1.93@2.43
Norfolk, Va.		2.07
Oklahoma City, Okla.		2.46
Omaha, Neb.		2.36
Peoria, Ill.		2.22
Philadelphia, Penn.		2.11@2.61
Phoenix, Ariz.		3.91*
Pittsburgh, Penn.		2.04
Portland, Colo.		2.80
Portland, Ore.‡		2.40@2.90a
Reno, Nev.‡		3.41a
Richmond, Va.		2.40@2.80
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.‡		2.71a
Savannah, Ga.		2.50
St. Louis, Mo.	.48¾	2.35
St. Paul. Minn.		2.12@2.22
Seattle, Wash.		2.90
Tampa, Fla.		2.40
Toledo, Ohio		2.60
Topeka, Kan.		2.41
Tulsa. Okla.		2.33
Wheeling, W. Va.		2.52
Winston-Salem, N. C.		2.29

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	.43¾	1.75
Bellingham, Wash.		2.10
Buffington, Ind.		1.80
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.55
Davenport, Calif.		2.05
Hannibal, Mo.		1.90
Hudson, N. Y.		1.75
Leeds, Ala.		1.65
Lime and Oswego, Ore.		2.50‡
Mildred, Kan.		2.35
Nazareth, Penn.		2.15
Northampton, Penn.		1.75
Richard City, Tenn.		2.05
Steelton, Minn.		1.85
Toledo, Ohio		2.20
Universal, Penn.		1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10c discount, 15 days.
†10c discount 10 days.
(a) Includes cloth sacks returnable at 10c each.
(b) 24c bbl. refund for paid freight bill.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	11.70u	.....	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kan.	1.70	4.00	.....	.....	.....	.....	10.00	.....	.....	.....	.....	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	.....	.....	13.50	.....	.....	.....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00@11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	4.50@5.00	13.10@14.00	5.00	.....	7.25	.....	.....	.....	.....	25.00
Douglas, Ariz.	.....	.....	6.00	14.50	15.00	.....	18.00	.....	30.00	.....	.....	.....	.....
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	.....	.....	.....	19.00	.....	15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65	.....	22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70@3.00	4.00	6.00	7.00@9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00@25.00
Los Angeles, Calif.	4.90	7.50m	7.50m	8.40	9.00	.....	10.00	.....	36.00u	9.00	19.00	21.00	27.50
Medicine Lodge, Kan.	1.70	4.00	.....	.....	.....	.....	.....	.....	15.00	.....	.....	15.00	20.00
Oakfield, N. Y.	2.50	.....	.....	6.00	8.00	8.00	.....	6.50	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash. (b)	6.00	10.00	10.00	13.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	20.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Hardwall plaster, 13.00; casting, finishing, molding, 14.00. (b) Calacoustic plaster 10.00 at mill; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks. (v) retail 35.00.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Chicago District¶	180.00@210.00a	230.00@260.00a	280.00@330.00a
Columbus, Ohio	16.00	.....	.....
Detroit, Mich.	.15@ .17†	.....	.24@.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00*	.....	.....
Graettinger, Iowa	.18@ .20	.....	.....
Indianapolis, Ind.	.10@ .12a	.....	.....
Los Angeles, Calif.	4x8x12—5.00*	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18@ .20	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M.	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per M.	130.00
8x 8x16, per M.	220.00
8x12x16, per M.	275.00
Columbus, Ohio:	
5x8x12, per 100	6.50
Detroit, Mich.:	
5½x8x12, per M.	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	8.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M.	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
	Each
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per M:	
3 in.	40.00
4 in.	50.00
6 in.	75.00
8 in.	100.00
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Chicago District	14.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	.....
Ensley, Ala. ("Slagtex")	9.00@12.00	.....
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Los Angeles, Calif.	12.50	.....
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	.....	14.00@ 23.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	.....
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	30.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.95	.....	1.27	.....	.....	2.01	.....	2.73	3.78	4.58	6.24	7.19	8.11
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month. †21-in. diam. ‡Price per 2-ft. length.

Symons Brothers Company and Nordberg Manufacturing Company Consolidate

THE CONSOLIDATION of Symons Brothers Co. with the Nordberg Manufacturing Co. brings together one of the leaders in the crusher field with a company long prominent in the design and building of large and highly efficient machinery particularly well known in the mining field.

For the past 25 years the Symons Brothers Co. and its predecessors have been engaged in the building of crushers. The experience gained from earlier designs later led to the Symons horizontal disc crusher; then followed the vertical disc crusher, both of which had many advantages.

A machine designed to incorporate the good qualities of both types of disc crushers next led to the Symons cone crusher. This design marked a new process of crushing, one which met with ready favor with those engaged in crushing operations. The successful performance of this type of machine is evidenced by its use by the largest mining companies, stone and gravel plants in the United States and many foreign countries, in a comparatively short time.

This consolidation permits of a more advantageous use of the exceptional manufacturing facilities of the Nordberg company for crusher manufacture. The building of crushers by the Nordberg Manufacturing Co. is by no means a new venture. For some time a large proportion of Symons crushers have been produced in the Nordberg plant. Here have also been built large hoists, compressors and Diesel engines used in mining service. Also included among Nordberg products are the Nordberg-Butler shovel, an air-operated machine for loading underground in drifts and tunnels, and the track shifter, now used for shifting track in many open-pit mines and large quarries.

With the Symons Brothers Co. a part of the Nordberg Manufacturing Co. past sales policies will continue. The same representatives engaged in the sale and servicing of Symons crushers will continue to do so.

The crusher department will be transferred to the main office of the Nordberg Manufacturing Co. at Milwaukee, branch offices will be continued at New York and Los Angeles.

Another Eastern Cement Plant Threatened with Shut-Down by European Competition

"IF THIS COMPETITION continues we will all have to close or reduce wages, and we will shut down before we'll cut wages," George F. Bayle, Sr., president of the Glens Falls Portland Cement Co. said. "The day of cheap labor has gone and gone forever, and I am glad that it has. The prosperity of the United States is due to the fact that men are earning enough money to give them not only the necessities of life, but some of the luxuries as well. Slashing of wages would cause an economic upheavel that would ruin the country."

Sufficient tariff protection is the only solution of the difficulty, Mr. Bayle continued. Workmen in Belgian cement plants receive 10 cents an hour as compared with an average wage of 50 to 60 cents in American mills. Cement is carried to this country as ballast for 33 cents a barrel, while the Glens Falls company has to pay a freight rate of 65 cents to Boston.

"We are now selling cement in the Boston district for 30 to 40 cents less than it costs us," Mr. Bayle said. "We are meeting this competition at such a loss in the hope that we will get tariff protection that will enable us to make enough profit to keep our plant in operation."

The company has an annual payroll of $600,000.

"The most dangerous competitor of American construction material industries, is Belgium, which has maintained her extremely low standards of wages, production costs and living costs, while organizing her construction material industries for export business ness to high standard countries, especially to the United States," said Mr. Bayle.

"As a result, Belgian building material costs are now 4% lower than they were in 1913, and, with the exception of one classification, are the lowest of any line of Belgian production. Her wholesale price for building materials is 4½% under 1913. In the United States the same materials are 77.1% higher.

"This explains both the cause and effect of the foreign invasion. The cause is that, with low wage scales, there is no home buying power in Belgium to consume large production. The effect is that Belgian producers have to go abroad to sell, thereby depleting the buying power of high wage countries like the United States.

"The invasion of American cement markets already has spread throughout the Atlantic and Pacific seaboards and only uncompleted shipping arrangements delay the invasion of the Mississippi and St. Lawrence waterways.

Mr. Bayle pointed out that the cement industry in New York state gives employment to several thousand persons. Its main markets lie in this state and in the New England territory. It is upon conditions within these two sections primarily that the future of the industry in this state depends. Owing to the fact that cement is one of the few major commodities which pays no tariff, the American seaboard has proved an ideal dumping ground for foreign cement produced at a cost which the American cement industry, paying American wages four times as high as those paid by foreign competitors, cannot hope to meet.—*Glens Falls* (N. Y.) *Post-Star.*

Pennsylvania Gypsum Company Plans Expansion

PLANS have been completed by the Pennsylvania Gypsum Co. for the construction of a pier and all the mechanical devices necessary to handle gypsum rock at Chester, Penn., where the company's plant is located. At the pier steamers which transport the rock from Nova Scotia will discharge their cargo into sheds from which it will be moved to the manufacturing plant nearby.

While the pier is under construction new machinery will be added to the manufacturing units of the plant, thoroughly modernizing the production of gypsum wall plaster, gypsum partition blocks and similar products.

Markets of Philadelphia, eastern Pennsylvania, southern New Jersey, Baltimore and Washington then will be supplied from the Chester plant.

To meet other competitive conditions, the company is preparing plans to build a plant at Brooklyn, N. Y., to supply the metropolitan New York district. The rock used at the Brooklyn plant will also come from quarries affiliated with the Pennsylvania Gypsum Co.—*Philadelphia* (Penn.) *Public Ledger.*

Rock-Cut Stone Co. Buys Madison Sand and Gravel Co.

THE ROCK-CUT STONE CO., Syracuse, N. Y., operators of stone and gravel plants, has acquired title to the Solsville, N. Y., plant of the Madison Sand and Gravel Co. A consideration of $100,000 is said to have been paid.

In announcing the sale, Raymond E. Brooks, secretary, of Hamilton, said that preferred stockholders will be paid off at $105 her share and among the common stockholders will be divided the balance. No statement has been made by the company as to the future dissolution of the company or its operation. The Solsville plant was constructed in the winter of 1926 and put into operation June 1 of that year. During its two years of operation it has furnished the materials for concrete construction of the Colgate Inn and Lawrence Hall, and for a number of Colgate fraternity houses, as well as for state highway construction.

John G. Carpenter of Rochester and Hamilton has been president of the company since its organization with Mr. Brooks as secretary and Prof. Harold O. Whitnall of Colgate University faculty, treasurer.

Three Forks (Montana) Cement Plant Active Again

THE PLANT of the Three Forks Portland Cement Co., Three Forks, Mont., at the head of the Missouri river, is presenting a scene of great activity, and the final touches are being perfected when the engine room will start the machinery to moving in the different departments for the manufacture of cement.

For the past several weeks, Superintendent Clark Leh has had a large crew of men, nearly one hundred having been employed, getting everything in readiness for the commencement of actual production. All machinery has been overhauled, shafting, belting, and chutes, etc., repaired and replaced with new, and the entire plant placed in highest degree if efficiency for the manufacture of cement of the highest quality for which the plant is noted.

Recently a charge of powder and dynamite, containing two tons of explosive, was discharged in the side of the hill, tearing loose thousands of tons of rock. A lighter charge was set a few days later and powder men are now setting another charge which will contain a couple of tons of powder and dynamite. This will insure a quantity of rock to enable the mill to operate for some time. According to Mr. Leh, it is the plans of the company to operate steadily for seven or eight months, and perhaps longer.—*Livingstone* (Mont.) *Enterprise.*

Read Phosphate Co. Now Is Part of Davison Co.

THE DAVISON CHEMICAL CO., Baltimore, Md., has announced the purchase of the controlling interest of the Read Phosphate Co., one of the largest independent fertilizer companies in the United States, with plants in Charleston, S. C., Cordele, Ga., Nashville, Tenn., and New Albany, Ind.

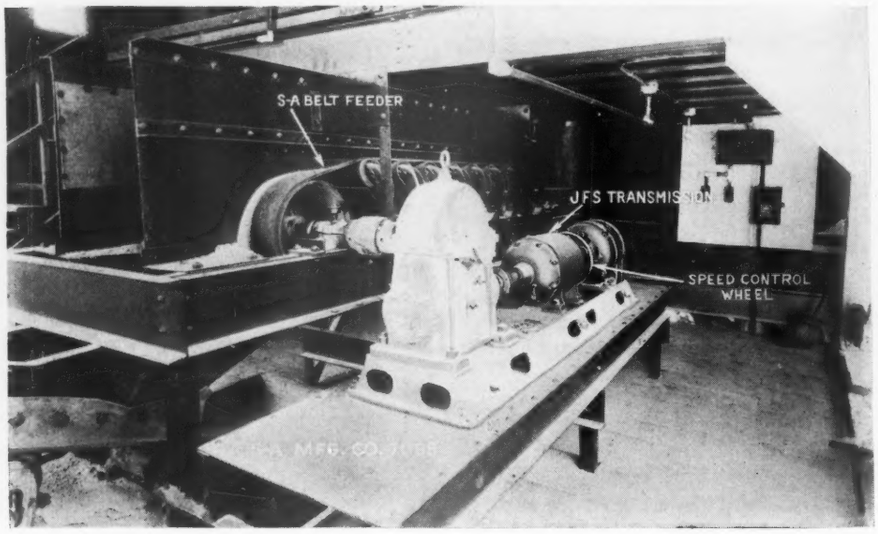
In addition to this the Davison company also has acquired controlling interest in the Welch Chemical Co. of Columbus, Ohio, and the Porter Fertilizer Works of Atlanta, Ga.

In acquiring control of these six plants, with a combined tonnage of approximately 180,000, and adding the tonnage it already has from its Baltimore and 16 other plants, the Davison company brings its total tonnage in line with that of the largest companies of the industry.

A. C. Read, president of the Read Phosphate Co., was elected a member of the board of Davison Chemical Co.

Directors of Davison Chemical Co. at a meeting held Friday, September 28, 1928, also concluded the purchase of properties of the Gulfport Fertilizer Co., located at Gulfport, Miss. This plant has at present capacity of 30,000 tons a year and will, as the business grows, be increased by the Davison company. It will afford another outlet for phosphate from the Davison company plant in Baltimore.

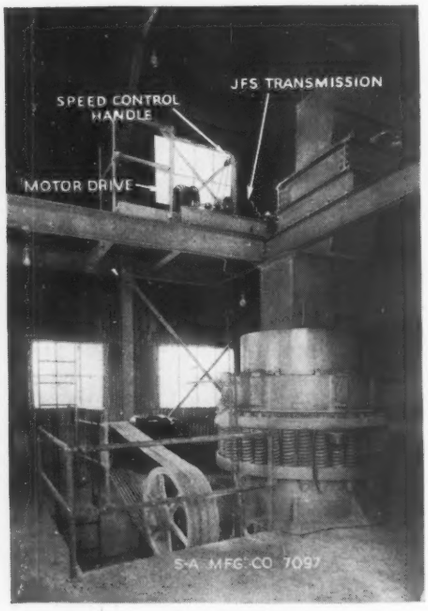
New Machinery and Equipment



Speed changer installation which permits accurate regulation of the desired volume of stone from the conveyors

Variable Speed Drives Control Conveyor Volumes

A RECENT installation of equipment of the Stephens-Adamson Mfg. Co. of Aurora, Ill., in the plant of the Herzog Lime and Stone Co., at Forest, Ohio, is of particular interest. The plant has been recently remodeled and the special feature of the new installation is the ready control which is obtained over the volumes of material delivered to the conveyors and screens. Belt feeders are used beneath the various storage bins to withdraw the several sizes of limestone and feed them to conveyors, crushers and screens for preparation. The 36-in. belts are carried upon Stephens-Adamson ball bearing carriers and when driven at a constant speed they will deliver uniform volumes of stone, thus preventing under- or over-loading the screens or crushers.



Feeder delivering limestone to the mill in controller by a variable speed transmission

It is frequently necessary to increase or decrease the volume of stone delivered to the various pieces of equipment, according to Bert Herzog, president of the lime company, and he has accomplished this by varying the speed of his feeders instead of by the usual method of using regulating gates. This is done by having each feeder driven by a 5-hp. constant speed motor through a "JFS Variable Speed Transmission," manufactured by the Stephens-Adamson company. The motor is direct-connected to the transmission and this drives the feeder through a 60-to-1 worm gear speed reducer. By using the JFS speed changer the operator can vary the speed of any feeder belt from 7 to 42 ft. per minute, with a corresponding capacity range of 50 to 300 tons per hour, it is stated. It is also possible for the operator to set the feeder for any capacity between these limits by simply turning the speed control wheel on the speed changer. The feeder will then deliver the desired volume without fiuctuation. The accompanying illustrations show the compact drive arrangements on the Herzog company feeders.

The Shaw Sand Classifier

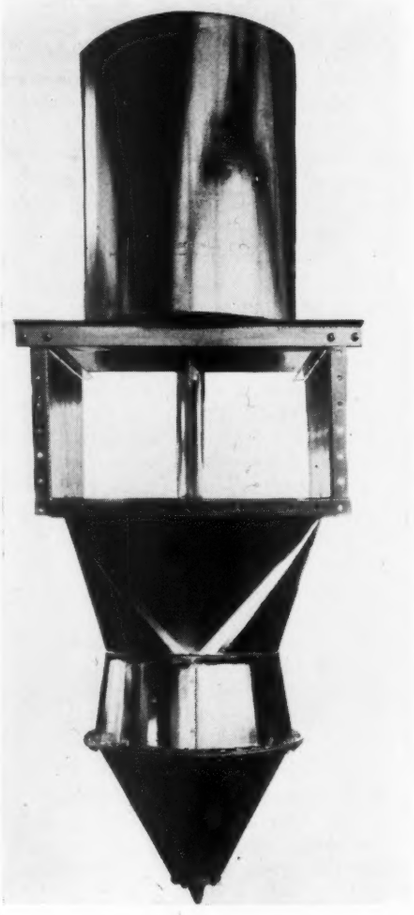
By C. S. HUNTINGTON
Engineer, Link-Belt Co., Chicago, Ill.

THE SHAW CLASSIFIER, an improved device for classifying and cleaning sand, is the development of four years of experimentation and operation in connection with the most difficult of sand classifying and cleaning operations.

The machine was developed to clean and grade sand with a more accurate sizing than can be done in existing machines. There has been a period of about four years of experimentation in the operation of the classifiers, and there are about 20 machines in use.

The Shaw classifier can be used as a single separator where the sand is to be separated from dirty water, or it can be used as a classifier, making one or more grades of sand, depending upon the number of machines used.

It will produce a drier sand than many of the automatic settling tanks now on the market, but not as dry as that produced by the



New sand classifier

screw dewatering conveyor or the dewatering flight conveyor.

The Shaw classifier is a combination of a surface current classifier and a rising current classifier.

Water, sand, dirt and other foreign matter from the washing screens flow down a slightly inclined flume which is extended horizontally through the Shaw classifier at the rectangular portion shown in the illustration. In the bottom of the classifier portion of this flume is a rectangular opening through which sand settles into the conical tank or separating chamber below, just as in any sand separator.

Above the flume is mounted a "hydraulic water" tank, which receives a supply of fresh water through a pipe entering at the top.

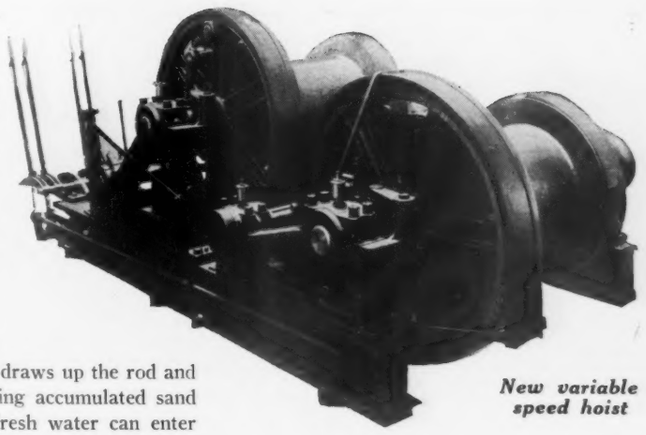
Inside of the "hydraulic water" tank is a float to which is fastened a vertical rod extending down through the pipe to the discharge opening at the bottom of the classifier, where a rubber tipped valve on the end of the rod regulates the discharge by reason of the raised or lowered position of the float.

The pressure of the "hydraulic water" as it spreads out around the flared edges of the central pipe in the separating chamber is sufficient to produce a gentle upward current, lifting out any dirt, silt, leaves, sticks or other foreign particles and sometimes some of the finer grains of sand, while the larger, heavier grains settle in the bottom.

When the accumulation of sand partrially stops up the entrance of fresh water, the back pressure in the float tank lifts the float, which in turn draws up the rod and its bottom valve, allowing accumulated sand to flow out until the fresh water can enter again and restore the former operations of separation. Practically the regulator is often sufficiently perfect to produce continuous flow.

Where it is desired to make a separation in the sizes of grains of sand, two or more classifiers are used in series.

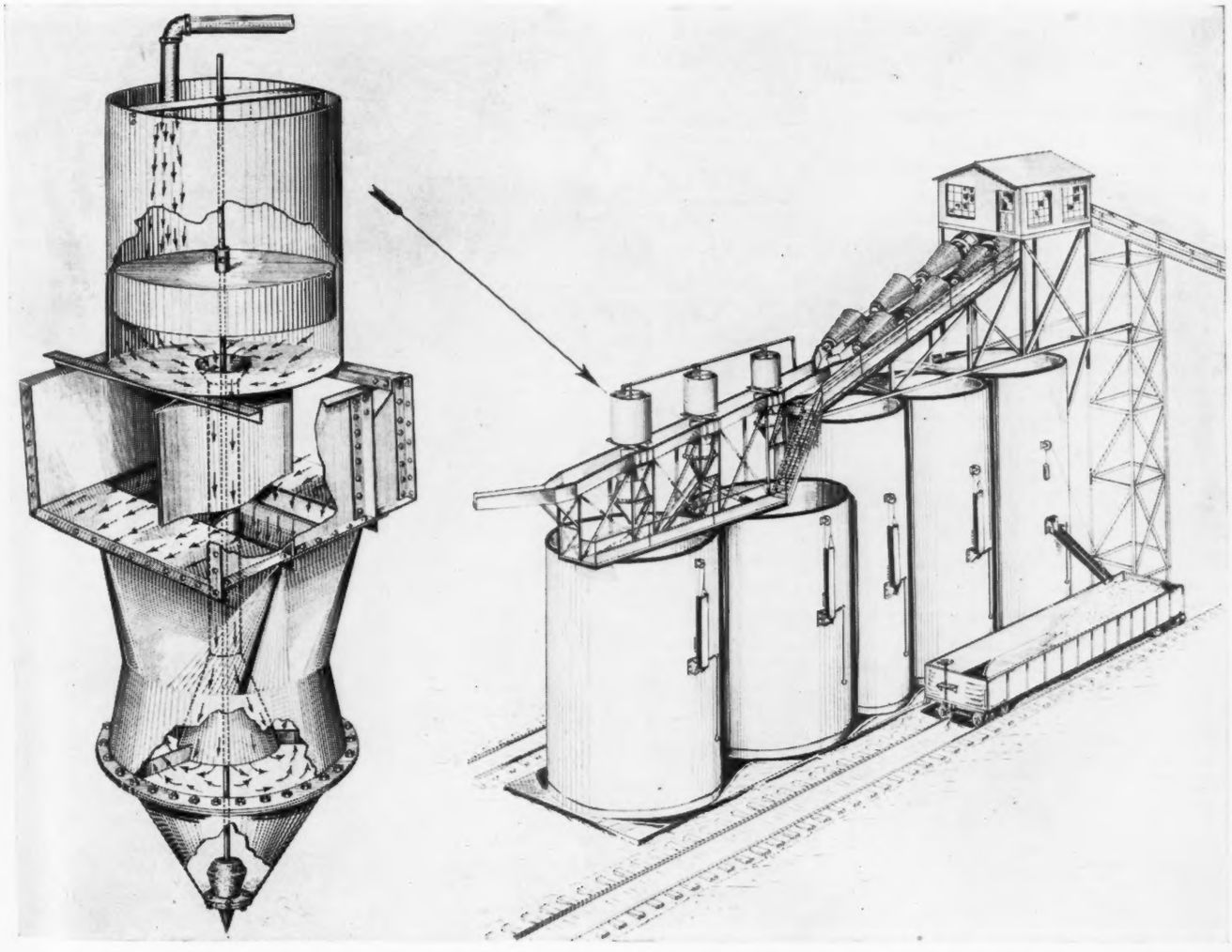
The Shaw classifier is patented, and is manufactured by the Link-Belt Co. of Chicago and Philadelphia. The illustrations below give a clear idea of the construction of the classifier and how it is installed in a standard sand and gravel plant design.



New variable speed hoist

Variable Speed Hoist

THE OTTUMWA IRON WORKS, Ottumwa, Iowa, have recently placed on the market a new development in the line of hoists—the result of about a year and one-half experimenting. The forward or pull-in drum is equipped with a two-speed device which can be operated by hand while the drums are in motion, thus permitting speed change without stopping.



Detail diagrammatic drawing of new type of sand classifier, and an illustration of the classifier in series on a sand plant

News of All the Industry

Incorporations

Bay Sand and Gravel Corp., Oyster Bay, Long Island, N. Y., 500 shares, no par. L. W. Hall.

Anchor Stone Co., Tampa, Fla., $25,000. O. H. Welch, C. S. Robinson, W. C. Brooker.

Catskill Mountain Quarries, Inc., Hunter, N. Y., $3000. M. C. Moseman, Tannersville, N. Y.

Interstate Cement Corp., Wilmington, Del., capital increased from 500 to 5750 shares, no par value.

Atlas Portland Cement Co., 25 Broadway, New York, has filed application for a Texas charter with capital of $2,000,000.

National Portland Cement Co., Dallas, Tex., 150,000 shares, no par. E. S. Gates, H. J. Harris, C. S. Atkinson.

Henderson and Hatcher, Inc., Philadelphia, Penn., 10,000 shares, no par. Corporation Guarantee and Trust Co., Wilmington, Del. Cement products manufacture.

Nustone Corp., Jacksonville, Fla., 100 shares, no par. J. McGibbon, W. S. Miller, Shirley Polatin, Susan Owen. Cement products manufacture.

National Construction Materials Corp., 111 West Washington St., Chicago, Ill., 20,000 shares, no par. G. F. Hilderbrandt, W. S. Karnaghan, W. Atchison.

Winchester Quarries, Inc., Boston, Mass., 100 shares, no par. Luther Hill, president; Frederick P. Hanford, treasurer, 318 Sumner St., Somerville, Mass.

Aztec Brick Co., Houston, Texas, $10,000. To manufacture concrete brick and plain and colored tile. H. G. Fields, Claude Smith and J. M. Wilder are the incorporators, and the company maintains a plant and office at 6501 Harrisburg Blvd., Houston.

Quarries

Piedmont Quarry Co., Salisbury, N. C., has purchased the C. M. Thomas quarry, about 5 miles from Winston-Salem. The new owners will continue operation of a larger scale.

Mann Co., Inc., Norristown, Penn., has purchased a quarry formerly operated by Magee, McNichol, Richardson and Ross. This quarry is across the Pennsylvania R. R. tracks from the quarry now operated by the Mann Co.

Alabama Lime and Stone Co., Birmingham, Ala., has added 100 ft. to ground storage for rock also 1300-ton steel bin for lime storage. The warehouse for hydrated lime is being extended and new pulverizing equipment is being installed for making roofing stone, asphalt fillers and fertilizer fillers.

Mellen, Wis. Announcement has been made of the formation of a company headed by Arthur A. Appleyard, Minneapolis capitalist, for the operation and development of the Black Granite quarries at Mellen, Wis. Approximately half a million dollars will be expended for equipment and new construction will include a finishing plant, a crushing plant and a railroad siding, the report states. One hundred men will immediately begin construction of new buildings and 200 will receive regular employment when the new quarries are in operation.

Sand and Gravel

Batesville Sand and Gravel Co., Pope, Miss., is moving its operation there from Scobey.

The Ohio Valley Sand Co., Wheeling, W. Va., has put a new plant in operation.

Carmargo Sand and Gravel Co., Carmargo, Okla., is developing a 30-acre property to produce 7 cars of sand and gravel daily.

Bradford Sand and Gravel Co., Great Falls, Mont., started operations recently at its newly constructed plant west of the city, following completion by the Great Northern railway of a 2500-ft. spur track to gravel pits near Sun River station. The plant obtains its material at the pits about 20 miles west of here between Vaughn and Simms, bringing the sand and gravel to Great Falls for washing and grading.

Denton Sand and Gravel Co., Pacific, Mo., has built a new plant on the Meramec river. The new plant has a capacity of 100 cars per day. The new plant is entirely operated by electric power with the exception of the big dredge boat that operates in the river. After the gravel and sand are washed and graded to size they are stored in a concrete bin from which railroad cars or trucks can be loaded. The Denton plant is supplying the sand and gravel for most of the highway work in the eastern part of the state besides for many of the large structures being erected in St. Louis.

Cement

Alpha Portland Cement Co., La Salle, Ill., is installing a Norblo dust-collecting system in the finish grinding department of the mill.

Whitehall Cement Mfg. Co. announces the removal of its office from the Land Title Bldg. to the Fidelity-Philadelphia Trust Bldg., 125 S. Broad St., Philadelphia, Penn.

Pennsylvania-Dixie Cement Corp., Clinchfield, Ga., plant, is not considering increasing its capacity, as reported recently in the local press, and repeated in ROCK PRODUCTS, September 29.

Great Lakes Portland Cement Co., Buffalo, N. Y., is the object of a petition to the city council by residence owners for abatement of an alleged dust nuisance.

Vulcanite Portland Cement Co., Phillipsburg, N. J., is reported to have closed its No. 2 mill on account of cement importations and seasonal slack. About 100 employes are affected.

International Cement Corp., New York City, is supplying its 24-hour high-strength portland cement "Incor" for repaving with concrete a section of the New York-Boston post road, one of the most congested through highways in the United States.

Olympia Portland Cement Co., Bellingham, Wash., entertained recently the members of the Western Public Works Contractors Association. Besides an inspection of the cement plant a banquet was tendered the contractors by W. P. Cameron, general manager of the cement company.

Ideal Cement Co., Denver, Colo., has brought in its third gas well on its Ada, Okla., property, and now has a potential gas output of 23 million cubic feet of gas daily, but as this amount is not required, two of the wells have been closed to keep the gas for later requirements. However, a fourth well is being drilled.

Cement Products

New Castle Concrete Block Co., New Castle, Penn., suffered a loss by fire September 23 to the extent of $5000. J. M. Gardner is owner.

Shearman Concrete Pipe Co., Memphis, Tenn., and Little Rock, Ark., will build a new plant at Tulsa, Okla. J. G. Suddreth is local manager at Tulsa.

Frank Curry and Co. of Tuscaloosa, Ala., have announced plans for a $15,000 plant for the manufacture of artificial stone. It is proposed to erect an all-stone building to have approximately 10,000 sq. ft. of floor space. The company will manufacture artificial stone, or imitation granite and marble.

Kalamazoo Cement Products Co., Kalamazoo, Mich., will increase its capital stock from $25,000 to $75,000 to make improvements and additions. Lester R. Ryan, secretary-treasurer, states the additional money is needed to care for increased business. In addition to its regular line of building materials, this company now makes and sells on an average of two complete septic tanks a day. Other departments have increased in proportion. Mr. Ryan states that considerable new machinery has been purchased to cut the cost of operation, while the boiler house is being enlarged to accommodate a new boiler. This company now requires six trucks to make delivery of products.

Lime

Muscle Shoals White Lime Co., Cherokee, Ala. has begun operations at a new plant having a capacity of 100 bbl. per day.

Pittsfield Lime and Stone Co., Pittsfield, Mass.; the Suffolk county court has issued a decree appointing Harry P. Levowich of Boston, Mass., receiver for the company. In his bill in equity, Royal Bassett, of New York City, claimed that the company owed him the sum of $1259.65, and costs of $15.73, on a judgment given him against the company by the district court of eastern Middlesex. He had been unable to execute the judgment, however, as he had been unable to find any assets to attach. He requested the appointment of a receiver.

Gypsum

Standard Gypsum Co., Long Beach, Calif., and the Schumacher Wall Board Co., Los Angeles, Calif., according to the *Wall Street Journal*, have reached an agreement affecting shipments and operations that is expected to effect important savings. Shipments of the companies will be consolidated for carload shipments.

Silica Sand

Rockport, Wash.—Negotiations are under way at present which may result in the development of a large silica plant near here. Howard Spruling of Sedro-Woolley, representative of the iron works in that city, has taken specimens.

Rock Phosphate

Southern Phosphate Co., Lakeland, Fla.; the Bucyrus dragline has arrived and is being assembled. Work in preparation for phosphate mining has been rushed all summer, following the action of the city voters in excluding the large property from the Lakeland boundaries, which was requested by the company preliminary to beginning operations.

Personals

Fred M. Young, president of the Young Radiator Co., Racine, Wis., has accepted a commission of captain in the Specialist Reserve, Air Corps, U. S. Army. Mr. Young served as aeronautical engineer and pilot with the U. S. Air Service during the late war, and has since kept in constant contact with this work.

H. E. Chilcoat

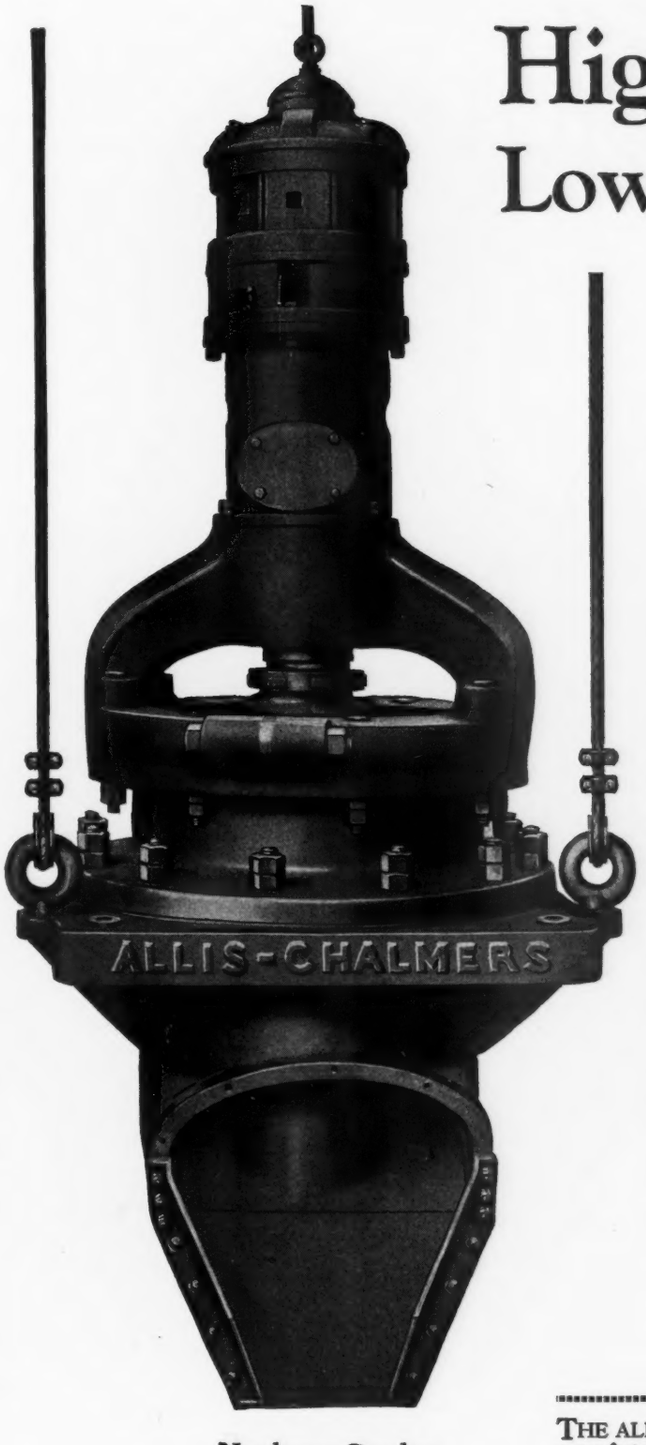
H. E. Chilcoat has joined the organization of the Koppel Industrial Car and Equipment Co. as manager of sales, Air Dump Car Division, with headquarters at Pittsburgh, Penn. Mr. Chilcoat has had considerable experience in sales work, having spent a number of years in the sales department of the Westinghouse Air Brake Co. and as manager of the Clark Car Co. For the past several years he has been engaged in consulting commercial engineering work.

John Sturtevant, Milan, Ohio, has been appointed chemist at the laboratories of the Bessemer Limestone and Cement Co., Bessemer, Penn.

P. C. Hodges, of the Marble Cliff Quarries Co., Columbus, Ohio, has been reappointed chairman of the transportation committee of the local chamber of commerce.

A. W. Ganshaw, former superintendent of the United States Gypsum Co.'s plant at Alabaster, Mich., has been transferred to the company's Oakfield, N. Y., plant as general works manager.

J. Ward Butler, recently general works manager of the Oakfield, N. Y., plant of the United States Gypsum Co., has been placed in charge of construction of the company's new plant at East Chicago, Ind.



Newhouse Crusher Style "B"

Patented and Patents Pending

High Capacity *and* Low Crushing Costs

with Newhouse Style "B" Crusher

MODERN requirements demand low crushing costs which are governed by the ability of the crushing equipment to produce high capacities per crushing unit. The Allis-Chalmers Newhouse Style "B" Crusher, with its large receiving opening, short rigid main shaft and rapid crushing stroke, meets these requirements. The result of this high speed crushing stroke is high capacity with a uniform product at a minimum of power per ton of material crushed. The machine is self-contained with vertical motor.

The forged steel heat treated main shaft is of heavy proportions, hollow bored for strength and passage of the drive shaft from the motor.

Lubrication is by external motor driven centrifugal pump with oil filter and cooler. The crusher is of heavy construction to meet the most severe crushing conditions. Concaves are reversible end for end. The machine is arranged for three point suspension by cables to the framework of the building, thus saving building space and foundation expense and eliminating building vibration.

The perfected Allis-Chalmers Newhouse Style "B" Crusher is the result of over seven years' work and study during which time all problems have been solved.

Made in three sizes:
7″, 10″, 14″ receiving opening.

THE ALLIS-CHALMERS MANUFACTURING COMPANY will, in the near future, announce another new type of crusher for fine crushing in which the capacity is relatively larger with respect to receiving opening than in the Newhouse Style "B" machine and will be especially suitable for those installations where larger capacity is desired and large receiving opening is not so essential. This new crusher will embody many improvements in which the industry is vitally interested.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

When writing advertisers, please mention ROCK PRODUCTS

Obituaries

Daniel S. Hefferman, superintendent of power and maintenance of the Atlas Portland Cement Co. New York City, was stricken with cerebral hemorrhage while riding in an eastbound 42nd St. surface car at 9:45 a. m. September 22 and died before Dr. Gunther of New York Hospital, who was summoned, arrived.

Manufacturers

Continental Motor Co. has received the "seal of successful performance" from the Associated General Contractors of America.

Timken Steel and Tube Co., Canton, Ohio, has placed Walter G. Hildorf in charge of all metallurgical work. For the past several years Mr. Hildorf has been metallurgical engineer for the Reo Motor Car Co., Lansing, Mich.

Ingersoll-Rand Co., American Locomotive Co., New York City, and the **General Electric Co.,** Schenectady, N. Y., have received an order to build jointly three more 300-hp. oil-electric locomotives for the Donner Steel Co., Buffalo, N. Y.

Atlas Conveyor Co., Philadelphia, Penn., has announced that A. J. Forschner, who joined the company in July as vice-president, has also taken over the duties of secretary for the company, in this capacity succeeding E. A. Thumlert, who is no longer connected with the company.

Foote Bros. Gear and Machine Co., Chicago, Ill., announces the appointment of A. H. Tischer, 704 N. Alabama St., Indianapolis, Ind., to represent them in the Indiana territory south of the line drawn below the city of Fort Wayne, Ind., and also including the city of Louisville, Ky.

Joseph T. Ryerson and Son, Chicago, Ill., has acquired the plant, merchandise and good-will of the E. P. Sanderson Co., Kendall Square, Cambridge, Mass. This makes a new link to the chain of Ryerson plants in Boston, New York, Buffalo, Detroit, Cincinnati, Cleveland, Chicago and St. Louis. The company has been operating on leased property in Cambridge since 1926, and the move will give them increased tonnage and plant facilities.

Trackson Co., Milwaukee, Wis., has appointed the following distributors in southern territories: Dealers Equipment and Implement Co., P. O. Box 2281, De Soto Station, Memphis, Tenn.; Evans Implement Co., 569-71 Whitehall St., Atlanta, Ga.; F-D Equipment Co., 4219 E. Grand Ave., Dallas, Tex.; Industrial Tractor and Equipment Corp., 409 N. Fifth St., Richmond, Va.; Industrial Machinery Co., 1717 Main St., Kansas City, Mo.; and Southern Equipment Co., Inc., 501 N. Alexander St., New Orleans, La.

Union Chain and Mfg. Co., Sandusky, Ohio, announces that, subject to the approval of the stockholders, they have acquired control of the American High Speed Chain Co. of Indianapolis, Ind., and will combine the two companies. As soon as the approval of the stockholders is had, the machinery and equipment of the American High Speed Chain Co. will be moved immediately to the Sandusky plant of the Union Chain and Mfg. Co., a new unit having been provided to permit the installation of such equipment. Two executives of the American High Speed Chain Co., J. C. Howe, president, and W. A. McCosh, vice-president, will move to Sandusky and become a part of the new organization. The executives of the company will be: Fred Emmons, president and treasurer; J. C. Howe, vice-president; Walter Hay, vice-president, and E. F. Emmons, secretary.

The Southwest Road Show will hold its fourth exhibit in the Wichita, Kansas, Coliseum, Feb. 26, 27, 28 and March 1, 1929. This exhibit, which is held every year, is under the auspices of the Wichita Thresher and Tractor Club. The Good Roads School held at the Coliseum in connection with the Road Show will be under the direct supervision of the Kansas State Highway Commission and Engineering Department of the Kansas State Agricultural College, with the co-operation of the Southwest, Central States and Federal Highway Engineers, United States Bureau of Public Roads and colleges, universities and other organizations interested.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Low Cost Gasification of Cheap Fuels. An illustrated bulletin on gas producers, with detailed views of the producer units and parts. DOVER BOILER WORKS, New York City.

New Economy in Power. A 28-page bulletin of Diesel type oil engines, with complete specifications, views of installations, and sample operating curves. BUCKEYE MACHINE CO., Lima, Ohio.

Valves. Illustrated catalog, designated as **No. 6,** covering the various types of Nordstrom valves. MERCO NORDSTROM VALVE CO., San Francisco, Calif.

Pump Catalog. New 24-page catalog of rotary, centrifugal and double-acting power pumps, with full specifications and illustrations of the various types. GOULDS PUMPS, INC., Seneca Falls, N. Y.

Elasco Superheater for Power Plants. New 52-page **Bulletin T-1** on superheaters, discussing all phases of superheat, and illustrating with views, drawings and curves the company's various types of installations. THE SUPERHEATER COMPANY, New York City.

Asphalt Paving. The Asphalt Association has issued a very attractive booklet entitled, "Old Pavements Made New," telling of resurfacing macadam, gravel, brick and other pavements with asphalt. THE ASPHALT ASSOCIATION, 441 Lexington Ave., New York City.

Rock Crushing Equipment. A new 48-page catalog, **No. 131,** of the complete line of crushers, illustrated with views of the equipments, detail drawings and pictures of installations, together with complete specifications. AUSTIN MFG. CO., Chicago.

Resistance Thermometers. A complete 54-page catalog **(No. 93)** of resistance thermometers, fully illustrated, describing the applications and types of Brown instruments as applied to modern industry. BROWN INSTRUMENT CO., Philadelphia.

Assuring Operating Profits. An illustrated, bound booklet of 32 pages describing the engineering practices of the company in problems of the industry. STURTEVANT MILL CO., Boston, Mass.

Speed Control by P. I. V. Chain. A loose-leaf book dealing with power transmission by means of the "Positive Infinitely Variable" chain, illustrated with numerous views of drives and detail drawings. CLOSE BROS., LTD., London, E. C. 3.

Automatic Arc-Welding by the Electronic Tornado Process. New, 8-page booklet describing the electronic tornado process for arc-welding, illustrated with views of the process and microscopic photographs of the weld. **Arc-Welding Equipment.** Illustrated bulletin discussing the variable-voltage single-operator equipment, versus the constant potential, multiple-operator equipment. LINCOLN ELECTRIC CO., Cleveland, Ohio.

Multi-Stage Centrifugal Pumps. Illustrated **Bulletin No. 212,** describing full line of centrifugal pumps and including high-pressure boiler feed pumps. **Air Cushioned Valve.** Illustrated announcement of valve for air compressors with a number of new features. **Semi-Portable Air Compressor Unit.** Illustrated announcement of a multiple-belt-driven, semi-portable air compressor, delivering 65 cu. ft. per minute. PENNSYLVANIA PUMP & COMPRESSOR CO., Easton, Penn.

Small Pumping Plants for Sand and Gravel Production. Illustrated 12-page **Bulletin No. 129,** describing various types of pumping units for small gravel plants. **Small Hydraulic Dredging Plants for Waterfront Developments.** New 12-page **Bulletin No. 127,** describing and illustrating the use of hydraulic dredging plants for waterfront and real estate developments. **Hydraulic Dredging Plants for Sand and Gravel Production.** Illustrated **Bulletin No. 128,** describing various hydraulic dredging installations for the production of sand and gravel. MORRIS MACHINE WORKS, Baldwinsville, N. Y.

G. E. Bulletins. GEA-71B. General purpose, induction motors for heavy duty starting. Motors applicable for use in polyphase circuits where frequency and heavy starting service is involved or where low starting current is imperative. **GEA-81B.** High torque, squirrel cage motors, type FTR (3 phase) and Type FQR (2 phase) 3 to 15 hp. Motor gives high starting torque with low starting current, good overload capacity and for use with magnetic starting switch (CR 7006). Illustrates construction details and partial list of field of application. **GEA-821A,** supersedes GEA-821. Alternating or direct current switches CR 2927 pressure and vacuum switches. Illustrates construction and tables with hp. ratings for this type of switch. GENERAL ELECTRIC CO., Schenectady, N Y.

Cog-Belt. A 24-page bulletin, publication **No. 101,** gives a description and uses of new type cog belt drive and outlines its industrial uses and advantages. Pulley and belt data necessary for use in connection with this type of drive is included and discussed with charts and diagrams for illustrating the text. The belt is similar in principle to the ordinary "V" type multiple unit belt used in connection with sheaved pulleys with the additional feature, that the pulley side of belt is corrugated. The pulleys are not corrugated. The basis of the design and construction of this type of belt is the compressions and resulting strains that the driving side of the belt receives, especially on short centers and small diameter pulleys, that distort and tend to destroy the fabric. The principles involved, the construction and uses are described in detail. DAYTON RUBBER MANUFACTURING CO., Dayton, Ohio.

National Gypsum Company Holds Exposition of Wall Building Methods

AN EXPOSITION of wall building methods is being held in the storeroom at 629 Main street, Buffalo, N. Y., under auspices of the National Gypsum Co.

It is the first time an exhibition of this kind has been held here. It is an educational demonstration. No materials are for sale.

A feature of the exhibit, which created much comment and interest, is the special showing of texture-finished walls, produced by a new material known as Troweltex, which has just been developed by the local research division of the National Gypsum Co. This material is applied by a trowel, and is not brushed on as has been the case with previous texturing materials.

The advantage of the trowel-applied finish, Gypsum company officials say, is that it takes the place of the regular white finish coat, thereby bringing the cost of textured walls within the means of every home builder. Demonstrators at the exhibit were kept busy all day showing how easily the new material is applied and textured immediately after application.—*Buffalo* (N. Y.) *Courier-Express.*

OWNERSHIP OF ROCK PRODUCTS

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every second Saturday at 542 South Dearborn street, Chicago, Ill., for October, 1928, State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Nathan C. Rockwood, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Nathan C. Rockwood; Managing Editor, None; Business Manager, Nathan C. Rockwood.

2. That the owners of 1% or more of the total amount of stock are: W. D. Callender, Nathan C. Rockwood, both of 542 South Dearborn street, Chicago, Ill.

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NATHAN C. ROCKWOOD,
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Sworn to and subscribed before me this 4th day of October, 1928.

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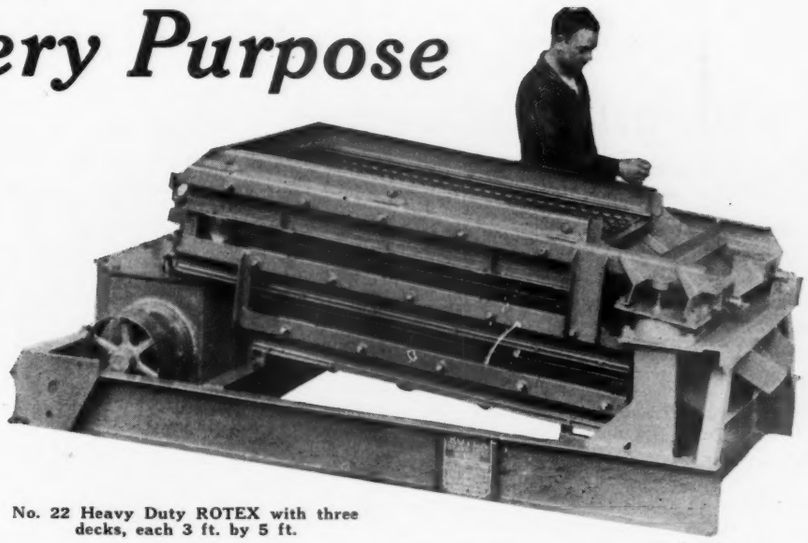

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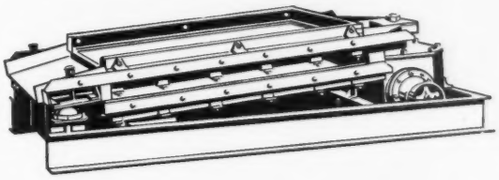

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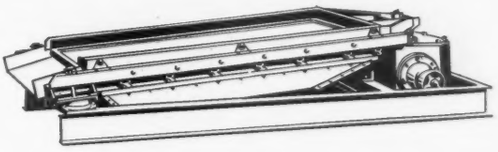

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542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S. W. I.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
HORATIO M. FITCH, *Associate Editor*
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280 Madison Ave., New York City. Tel. Caledonia 4474
WALTER E. EDWARDS, *Central Advertising Manager*
803 Leader Bldg., Cleveland. Tel. Main 4056
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